FINAL SL-4 R+10 DAY MISSION EVALUATION REPORT (MEDICAL EXPERIMENTS)

FEBRUARY 28, 1974

PREPARED FOR

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
JOHNSON SPACE CENTER
HOUSTON, TEXAS

CONTRACT NO. NAS9-11037

PREPARED BY

GENERAL ELECTRIC COMPANY
SPACE DIVISION
APOLLO AND GROUND SYSTEMS
HOUSTON OPERATIONS
1830 NASA BOULEVARD
P. O. BOX 58408
HOUSTON, TEXAS

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PREFACE

This report is submitted in accordance with the approved Memorandum modification (DB4/73/174) to the MSC Skylab Experiments Document, Scientific Analysis and Reporting Plan, July 14, 1974, MSC-03022.

This Ten-Day Report is a formal reporting requirement containing initial reportable operational information for the purpose of expediting dissemination of the information to participating organizations having to prepare additional working correspondence.

SECTION I

INTRODUCTION

A. General Mission Summary

The Skylab 4 mission was launched on November 16, 1973, at 0801 c.d.t. and was terminated on February 8, 1974, at 1017 c.d.t. The duration of this mission which was flown by Astronauts Lt. Col. Gerald P. Carr (CDR), Dr. Edward G. Gibson (SPT), and Lt. Col. William R. Pogue (PLT) was 85 days, 4 hours, and 16 minutes. Sixteen (16) principal medical experiments were planned and executed. An additional number of special medical tests were conducted tangentially to the planned experiments. This report represents the third and last of a series of Ten-Day mission evaluation reports. One has been issued for each of the prior manned Skylab missions.

B. Experiment Operations Summary

Several medical experiment accomplishment summaries appear in this document. Section II contains a summarized medical operational chronology; Section III contains a review of experiment and special testing accomplishments; and Section IV summarizes equipment and procedural difficulties and anomalies. This assessment of accomplishments spans the SL-4 crew's preflight phase and the first seven days after recovery. The findings are preliminary and may be revised as successive analyses are completed. Clinical and experiment data discussions are excluded and shall appear in an LSD SL-4 Medical Report.

Medical mission accomplishments are grouped as follows:

a. M071 - Mineral Balance

b. M073 - Bioassay of Body Fluids

c. M074 - Specimen Mass Measurement Device

d. M078 - Bone Mineral Measurement

e. M092 - Lower Body Negative Pressure

f. M093 - Vectorcardiogram

g. M110 series - Hematology and Immunology

h. M131 - Vestibular Function

i. M133 - Sleep Monitoring

j. M151 - Time and Motion

k. M171 - Metabolic Activity

l. M172 - Body Mass Measurement Devices

m. Other - Special Tests

Experiments M071, M073, M110 series, and M151 depend on specimens and/or photographs collected during flight. These specimens and photographs are being processed. No operationally applicable analytical data are currently available. This condition applies also to several special tests. The following summaries relate to inflight accomplishments only.

1. M071/M073

The collection of urine, feces, vomitus, and measurements of diet residue, and the recording of menu deviations for

experiments M071 (Mineral Balance) and M073 (Bioassay of Body Fluids) were accomplished. Body mass measurements were made on each crewman every day. Due to a shortage of urine sample bags, it was necessary to interchange scheduled 24-hour urine pools with 36-hour pools just beyond the midpoint of the mission. Boric acid was used as a urine preservative to offset the impact of possible freezer malfunctions which never occurred. Special urine specific gravity measurements were performed on each crewman concurrently with the first four blood draws.

2. M074/M172

Experiments M074 (Specimen Mass Measurement Device Calibration) and M172 (Body Mass Measurement Device Calibration) were accomplished three times on each device. Some of the Specimen Mass Measurement Devices' calibration masses were misplaced early in the mission and calibrations were limited to a 0-500 gm - 0 procedure. During the latter third of the mission, 16 mm DAC and still documentary photography were accomplished on these devices during normal and representative operations. Toward the end of the mission the Body Mass Measurement Device was used to determine insensible water losses occurring during sleep and during regulated exercise. Data from these measurements are expected to contribute to the postflight mineral balance studies. M074 and M172 met 100% of their pre-mission requirements except for the effect of the loss of the M074 cal masses.

3. M078

This experiment consists of preflight and postflight testing only. These tests were performed as planned.

4. M092

The pre-mission flight plan required M092 (Lower Body Negative Pressure) to be performed on each crewman every 3 $\pm$ 1 days. M092 began on MD5. When crew time became critical, the schedule was modified to every 4 + 0.-1 days. This schedule remained in effect through MD58 when the 3 $\pm$ 1 day requirement was reinstituted. Twenty-two M092 runs were made on the CDR and SPT; 23 on the PLT. M092 was the test device for two special tests: 1) Post M092 Limb Blood Flow (Cardiovascular test #2 using a blood pressure cuff to restrict venous blood return and test #1 which tested the capability of the subject's leg muscles to pump blood during a negative delta pressure) and 2) IR Facial Photos of the subject during the conduct of M092. Limb Blood Flow tests were performed seven times on the CDR and PLT and six times on the SPT. Three abbreviated venous compliance tests were run on each crewman immediately following their last M092 performance. Facial photo sessions were completed six times on the CDR and PLT and five on the SPT.

5. M093

M093 was scheduled with the same intervals as M092. This schedule was satisfied with independent runs together with VCG data obtained from M171 runs. Each crewman had nine independent M093 runs and twelve acceptable combined M171/M093 runs for a total of 21 vectorcardiograms with exercise.

VCG data were obtained from special instrumented crew exercises also. Discussions of these exercises appear under the M171 experiment and "Special Tests".

6. M110 Series

Blood samples were acquired 8 times from each crewman. Special crew hemoglobin (Hb) measurements were conducted in conjunction with each blood draw except for the last. With the addition of a special Hb on MD62, each crewman had eight hemoglobin determinations voice reported to the M110 PCS.

7. M131

M131 (Human Vestibular Function) had a pre-mission planning requirement for seven each Motion Sensitivity (MS) and Oculogyral Illusion (OGI) tests on each crewman together with three Spatial Localization tests per crewman. MS was accomplished five times by the CDR and four times by the SPT and PLT. OGI was tested six times on each crewman. Spatial Localization was run three times on each crewman. On Mission Days 73 and 74, the crew performed modified MS protocols.

Conventionally, M131-1 consists of OGI run followed by an MS run; however, on MD73 and MD74 the PI had requested the crew to conduct double MS tests - the first test in the CW direction and the second CCW. Protocols called for the rotating litter chair at 30 rpm with 150 crew head movements. Independent OGI runs preceded and followed the modified MS runs to prevent physiological interference.

8. M133

M133 (Sleep Monitoring) had been scheduled for eight performances; however, after the mission began, the FMT approved an additional ten runs on MD28 after the SPT had demonstrated that the electrode caps could be refurbished successfully. M133 continued a five-day scheduling through MD60. MD65 was scrubbed when the OWS experienced some elevated internal temperatures and the SPT slept in the cooler MDA. The schedule was picked up again on MD72; but the MD76 performance slipped to MD77 after a mild skin rash formed on the upper side of the SPT's neck. M133 was closed out with consecutive runs on MD's 80, 81, and 82.

9. M151

Experiment M151 (Time and Motion Study) photography was accomplished as planned, together with four additional photographic sessions on M092/093/171 during the final stages of the mission. The latter sessions will be used to obtain end-of-mission crew task performance effects.

10. M171

M171 (Metabolic Activity) had a pre-mission planning requirement for 12 experiment performances per crewman. This experiment began on MD5 also and achieved 100% of its scheduling objectives. Vital capacity measurements were accomplished as part of the crew checklist for each M171 performance. As a result of crew options, several instrumented physical training exercises at maximum work loads and also during treadmill exercise were recorded.

11. Special Tests

Several special medical tests were conducted during the mission. While most of the tests were specified in the pre-mission Mission Requirements Document, several were elevated to that status after the mission began. Many were listed in the SL-3 R+10 Day Mission Evaluation Report and have been tabulated again to provide a comprehensive summary. Brief descriptions of these itemized tests appear in Section III, Medical Operational Review.

a. Environmental Microbiology

b. Water Sample

c. Iodine Monitoring

d. Carbon Monoxide Monitoring

e. Taste and Aroma Evaluation

f. Food Package

g. Atmospheric Volatile Concentrator

h. Girth and Height Measurements and Crew Profile Photos

(1) Girth Measurements

(2) IR Anatomical Photo

(3) Center of Mass Measurements

i. Sweat Samples

j. Blood Flow in Limbs

k. Stereo Photogrammetry

l. M073 Specific Gravity Measurements

m. M092 Facial Photographs

n. M110 Hemoglobin Measurements

o. Insensible Water Loss

p. Visual Light Flash Phenomenon

q. Pre- and Post-Exercise Muscle Girth Measurement

r. Instrumented Exercise

Environmental microbiology met all requirements except for conducting the simulated illness event. The length of the illness event demonstration prohibited a successful scheduling opportunity among the other scientific mission demands.

Water sampling, taste and aroma evaluation, iodine monitoring, CO monitoring, and atmospheric volatile concentration samples were accomplished without any major deviations from the prescribed mission requirements.

Considerable measurements were made of crew body size and configuration along with shifts of body masses, especially fluids. The former effects were accomplished with detailed limb volume measurements, IR photography, and stereophotography. The latter effects were measured with simple center of mass determinations. Except for stereo photos, at least four sets of measurements were relatively evenly distributed throughout the mission duration on each crewman. Stereo photos were taken on each crewman during the early and late stages of the mission. Documentary photographs were taken of limb volume and center of mass measurements during normal operations. Stereophotography and limb volume met 67% and 89% respectively of their pre-mission requirements. Performances were not always scheduled at optimal intervals.

Sweat samples were taken twice on each crewman to support mineral balance studies. While more samples were scheduled, the additional performances were deleted when crew time became critical.

Limb blood flow measurements were made at regular intervals across the length of the mission to support M092 LBNP findings. Facial photography planned in conjunction with LBNP was completed; however, the schedule was slightly modified when crew time became critical.

Hemoglobin and urine specific gravity measurements were made following M110 blood draws. Hemoglobin determinations were accomplished for all but the pre-recovery last blood draw. Urine specific gravity measurements were eliminated after the fourth blood draw when crew time became critical.

Insensible water loss, visual light flash phenomenon, and pre- and post-exercise muscle girth measurements were met; however, the light flash observations conducted during MD74 were so enlightening, they were repeated on MD81 for a one-hour period.

Instrumented exercise measurements were obtained during personal physical conditioning on the bicycle ergometer. These data were obtained approximately six times from each crewman at maximal ergometer work loads. The measurements supported M093 and M171 findings.

Biomedical items stowed in a revisit bag consisted of rehydratable and thermostabilized foods, a bread package, pudding, a beverage, and a surgical glove. Other than two M092 leg bands, several drug samples, and scheduled experiment or DTO specimens, no other biomedical items were returned.

12. Accomplishment Summary

Table 1.1 and Table 1.2 provide a general overview and success index of inflight medical experiments and special test accomplishments.

MEDICAL EXPERIMENTS ACCOMPLISHMENT SUMMARY

MEDICAL EXPERIMENT	SCHEDULE	ACCOMPLISHED	SUCCESS
M071			
Food Track	1/crewman/day	84/crewman	100%
Body Weight	1/crewman/day	83/crewman	99%
Fecal/vomitus	1/occurrence		100%
Urine Measurement	1/crewman/day	75/crewman	80%
H_2O Intake Measurement	1/crewman/day	84/crewman	100%
M073			
Urine Sample	1/crewman/day	78/crewman	93%
M074			
SMMD Cal	3 times	3	100%
M078			
Not Required Inflight	N/A	---	---
M092			
LBNP	26/crewman	67	86%
M093			
Vectorcardiogram	26/crewman	63	81%
M110			
Blood Samples	8/crewman	24	100%
M131			
-1 OGI/MS	(7/7)/crewman	(18/13)	74%
-2 Spat. Localization	3/crewman	9	100%
M133			
Sleep Monitoring	18 times/SPT	18	100%
M151			
Photography	30 activities	29	97%
M171			
Metabolic Activity	12/crewman	12	100%
M172			
BMMD Cal	3 times	3	100%

Table 1.1

SPECIAL MEDICAL TEST ACCOMPLISHMENTS SUMMARY

DTO #	DESIGNATION	SCHEDULE	ACCOMPLISHMENTS	SUCCESS
20.10	Environmental Microbiology	5 performances	4	80%
20.16	Water Sample	1	1	100%
20.17	Iodine Monitoring	6 times	6	100%
20.18	Carbon Monoxide Monitoring	4 times	3	75%
20.21	Taste and Aroma Evaluation	6 performances	6	100%
20.22	Food Package	Deleted		
20.23	Atmospheric Volatile Concentrator	3 performances	3	100%
20.25	Limb Volume Measurements	18 performances	16	89%
20.25	IR Anatomical Photos	21 performances	18	86%
20.25	Center of Mass Measurements	12 performances	12	100%
20.27	Sweat Samples	9 performances	3	33%
20.28	Blood Flow in Limbs	21 performances	19	90%
20.29	Stereo photogrammetry	3 sets/crewman	2 sets/crewman	67%
20.31	Visual Light Flash Phenomenon	1 observation	2	200%
N/A	M073 Urine Specific Gravity Measurements	8/crewman	4/creman	50%
N/A	M092 Facial Photos	21 sets	17 sets	81%
N/A	M110 Hemoglobin Measurements	8/crewman	8/crewman	100%
N/A	Insensible Water Hose	2 perform/crewman	2 perform/crewman	100%
N/A	Pre- and Post-Exercise Muscle Girth Measurements	3 performances	2	67%
N/A	Special Venous Compliance Tests	1 performance	3	300%

TABLE 1.2

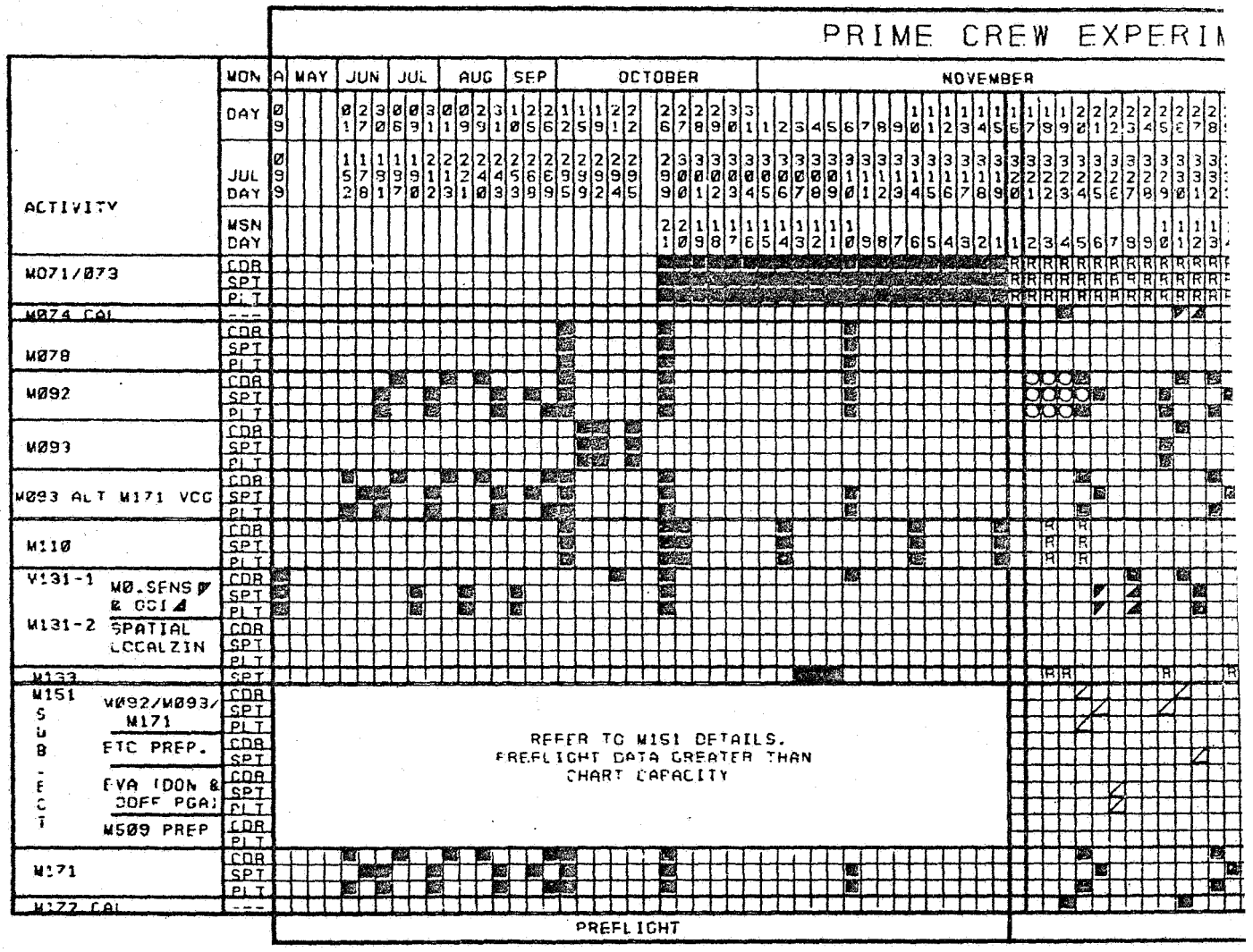
SECTION II

OPERATIONAL CHRONOLOGY SUMMARY

Table 2.1, Prime Crew Accomplishment Schedule, contains a chronology of medical experiment accomplishments.

A legend at the bottom of the table provides descriptive information about the status of each experiment run. The table itself can be used as an index for obtaining further detailed information about a given run. For example, the coded symbol (/) appears for an experiment. This symbol designates that while the performance was completed, data acquired from the run were unavailable at the time of this report. Having the experiment of interest, the crewman's "ID", and the day of interest, further details may be gathered from corresponding detailed tables appearing in Section III.

Table 2.2, Special Medical Tests and DTO Accomplishment Schedule, contains an inflight chronology of special medical tests.



◿ SESSION COMPLETE; RAW DATA UNAVAILBLE
R SESSION COMPLETE; ACCEPTABLE RAW DATA
■ SESSION COMPLETE; ACCEPTABLE VERIFIED DATA
◤ HALF SESSION COMPLETE; ACCEPTABLE VERIFIED DATA

○ PRE M092 LEG AND ARM BLOOD PRESSURES AND CALF GIRTH MEASURMENTS

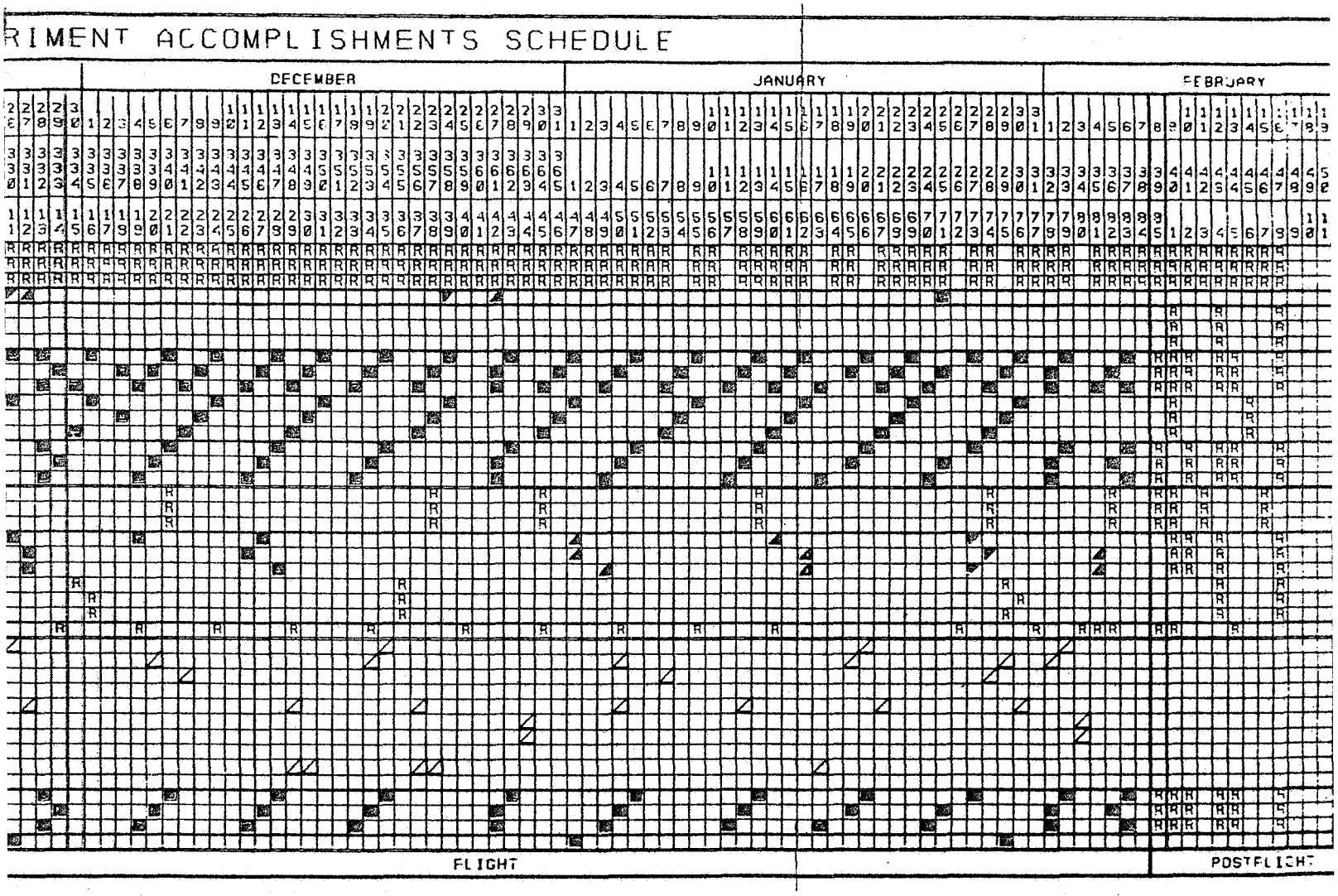

RIMENT ACCOMPLISHMENTS SCHEDULE
DECEMBER
JANUARY
FEBRUARY
FLIGHT
POSTFLIGHT

TABLE 2.1

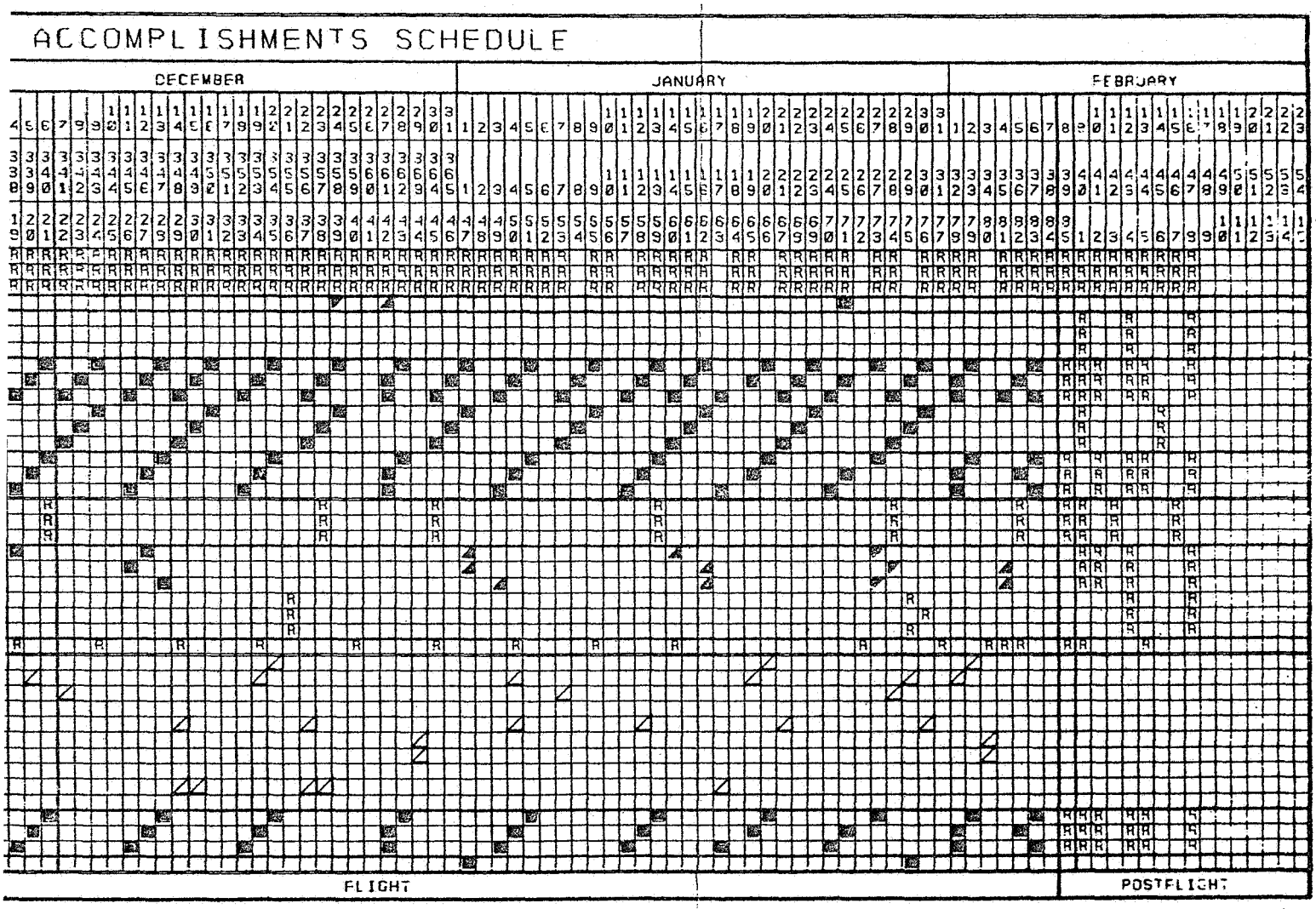
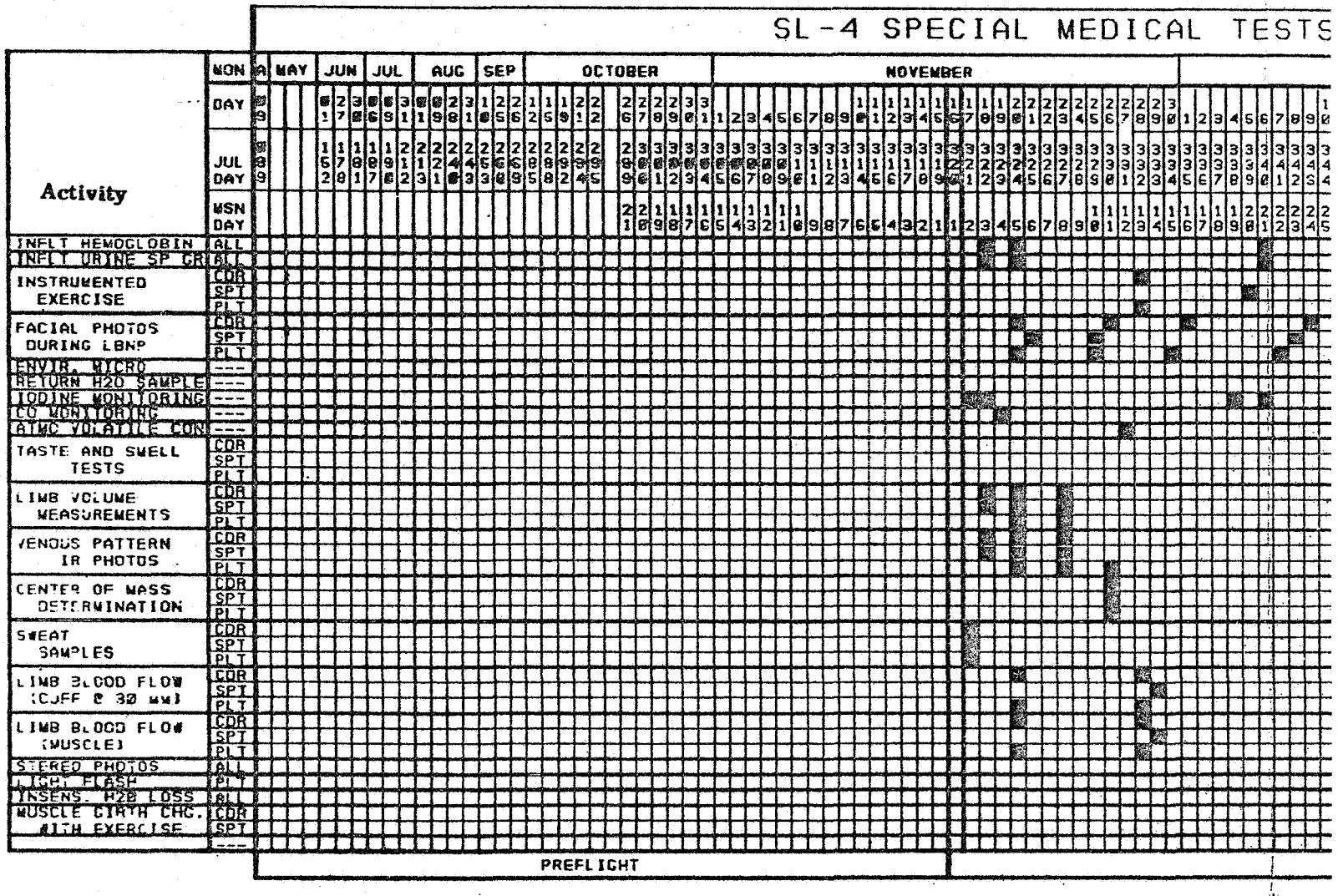

ACCOMPLISHMENTS SCHEDULE
DECEMBER
JANUARY
FEBRUARY
FLIGHT
POSTFLIGHT

TABLE 2.1



■ SESSION COMPLETE

◤ HALF SESSION COMPLETE

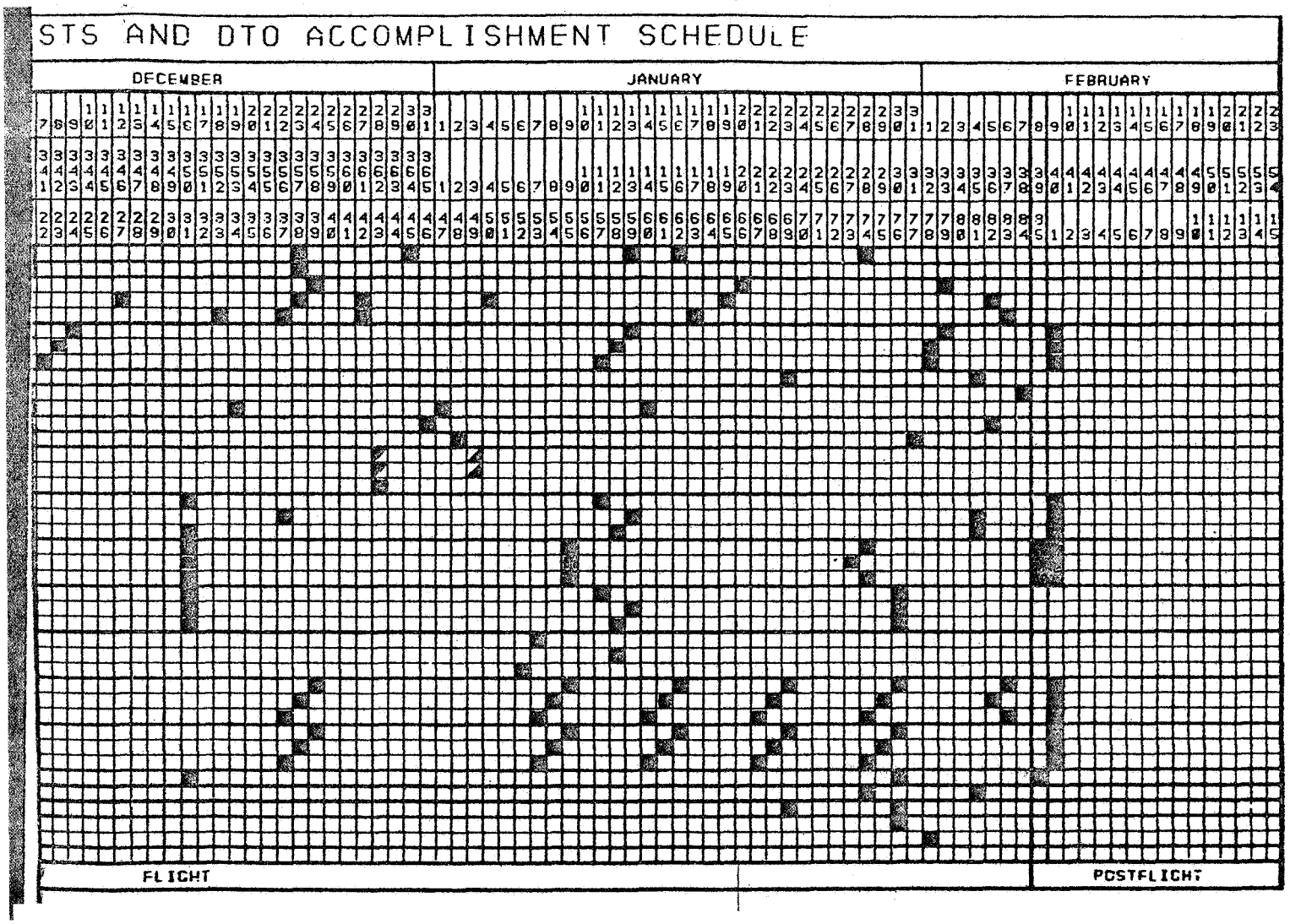

STS AND DTO ACCOMPLISHMENT SCHEDULE
DECEMBER
JANUARY
FEBRUARY
FLIGHT
POSTFLIGHT

TABLE 2.2

SECTION III

MEDICAL OPERATIONAL REVIEW
DETAILED REVIEW OF EACH EXPERIMENT RUN

The tables appearing in this section are organized serially by experiment and subdivided by crewman. One table appears for each crewman within a given experiment.

The tables are divided into nine (9) categories which are defined as follows:

a) PROTOCOL: Nominal, if the PI believes the experiment was was conducted within the constraints and general medical procedures for that experiment. Unsatisfactory, if a major portion of the experiment was omitted or accomplished so improperly that it is of no medical value and should be rescheduled.

b) PROCEDURES: Nominal, if accomplished per the checklist. Deviated, if the procedure was changed prior to obtaining approval of the PCS/PI. Future use of an approved deviation will be classed as nominal.

c) CLINICAL FACTORS: None, if the crewman involved has no health problems. Significant Impact, if there is reason to believe the crewman's health could have resulted in degraded experiment data.

d) TIME REQUIRED: Nominal, if close to or less than that scheduled or expected. Above Nominal, if experiment required significantly longer time than expected.

e) T/M QUALITY or SAMPLE QUALITY: Satisfactory, if telemetry reception was generally readable or sample quality was usable. T/M is mainly concerned with air to ground and ground station to JSC/MDRS terminal links. Unsatisfactory, if large batches of data or a sample were lost or unusable.

f) T/M COVERAGE or SAMPLE QUANTITY: Satisfactory, if the air/ground data system was "up", for the entire duration of the experiment. Unsatisfactory, if data system was "down" or data dumps not performed properly. Sample quantity refers to the adequacy of the sample when applicable.

g) EXPERIMENT HARDWARE: Satisfactory, if the crew was able to operate it satisfactorily and with the mandatory measurements operating. Unsatisfactory, if any major component of the equipment failed prior to the end of that run, even though a workaround was instituted.

h) DATA PROCESSING: Satisfactory, if the data as received at the MDRS terminal was processed by CAAD in a format usable by the PI. Unsatisfactory, if the data could not be processed, or only such a small portion was usable as to make the experiment run useless.

i) ANOMALIES/PROBLEMS: No. Documented, is a count of those listed by LSD. This does not include items opened by mistake based on misunderstandings. No. Closed includes those which have been adequately explained or acceptable workarounds arrived at.

Those for which the cause has not yet been explained are considered open. In some cases the close-out cannot be made until postflight data or sample analysis.

j) SUMMARY: Acceptable means that the PI considers that session as having produced enough useful data to satisfy the objectives of the experiment. An unacceptable run is one which is either obviously unusable or one which the PI decides is not usable after analysis of the data from the as-run protocol.

The latter part of this Section contains descriptive information of the special tests.

M071 - MINERAL BALANCE

The M071 experiment began 27 days prior to launch, continued throughout flight, and is scheduled to end 18 days after crew recovery at the time of writing, February 15, 1974, the postflight period in the 7th day.

Food intake monitoring has been complete, and within operational constraints, the intake of nutrients has been satisfactorily controlled. To meet the extended mission duration (56 to 85 days), a high density food diet was used to supplement the nominal Skylab menu. Water intake has been measured satisfactorily also.

Urine was collected and preserved satisfactorily throughout the duration of the experiment. (See M073 Experiment - Bioassay of Body Fluids.)

Collection of fecal samples has been complete through this time. During the inflight phase, these samples were measured for wet mass on the Specimen Mass Measurement Device. Subsequently, they were dried satisfactorily and returned to JSC for analysis.

Sweat samples were taken of each crewman and have not been unstowed. These samples, along with special end-of-mission insensible water loss measurements, should provide additional data for the mineral balance studies.

Table 3-1 contains a review of M071 data collection.

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M 0 7 1/073

MISSION NO: SL-4
CREWMAN: (C)-(S)-(P)-
NAME: CARR/GIBSON/POGUE

	PRE-FLT	FLIGHT
EXP. REPETITION		
MISSION DAY		0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8
JULIAN DAY	2 9 3 ← → 3 1 9	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 3 3 3 3 3 3 3 3 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7
PROTOCOL	← N/A →	
a. NOMINAL		/ / / / / / / / / / / / / / / / / /
b. UNSATISFACTORY		
PROCEDURES	← N/A →	
c. NOMINAL		/ / / / / / / / / / / / / / / / / /
d. DEVIATED		
CLINICAL FACTORS	← N/A →	
e. NONE		/ / / / / / / / / / / / / / / / / /
f. SIGNIF. IMPACT		
TIME REQUIRED	← N/A →	
g. NOMINAL		/ / / / / / / / / / / / / / / / / /
h. ABOVE NOMINAL		
SAMPLE QUALITY	← N/A →	NOT AVAILABLE
i. SATISFACTORY		
j. UNSATISFACTORY		
SAMPLE QUANTITY	← N/A →	NOT AVAILABLE
k. SATISFACTORY		
l. UNSATISFACTORY		
EXPERIMENT HARDWARE	← N/A →	
m. SATISFACTORY		/ / / / / / / / / / / / / / / / / /
n. UNSATISFACTORY		
DATA PROCESSING		
o. SATISFACTORY	/ / / / / / / / /	
p. UNSATISFACTORY		
ANOMALIES/PROBLEMS		# # 1 1
No. Documented	0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
No. Closed		
SUMMARY		
ACCEPTABLE	/ / / / / / / / /	/ / / / / / / / / / / / / / / / / /
UNACCEPTABLE		

#1 - Urine Sampled, but not measured.

TABLE 3-1

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M Q Z 1/073

MISSION NO: SL-4
CREWMAN: (C)-(S)-(P)-
NAME: CARR/GIBSON/POGUE

	PRE-FLT									FLIGHT																		POST-FLIGHT						
EXP. REPETITION																																	
MISSION DAY	1	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	4	4	4	4	4	4	4						
	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6					
JULIAN DAY	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3					
	3	3	4	4	4	4	4	4	4	4	4	4	5	5	5	5	5	5	5	5	5	6	6	6	6	6	6						
	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5					
PROTOCOL																																	
a. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/					
b. UNSATISFACTORY																																	
PROCEDURES																																	
c. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/					
d. DEVIATED																																	
CLINICAL FACTORS																																	
e. NONE	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/					
f. SIGNIF. IMPACT																																	
TIME REQUIRED																																	
g. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/					
h. ABOVE NOMINAL																																	
SAMPLE QUANTITY									NOT AVAILABLE																								
i. SATISFACTORY																																	
j. UNSATISFACTORY																																	
SAMPLE QUALITY									NOT AVAILABLE																								
k. SATISFACTORY																																	
l. UNSATISFACTORY																																	
EXPERIMENT HARDWARE																																	
m. SATISFACTORY	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/					
n. UNSATISFACTORY																																	
DATA PROCESSING									NOT AVAILABLE																								
o. SATISFACTORY																																	
p. UNSATISFACTORY																																	
ANOMALIES/PROBLEMS																																	
No. Documented	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
No. Closed																																	
SUMMARY																																	
ACCEPTABLE	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/					
UNACCEPTABLE																																	

TABLE 3-1 (Cont'd)

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M Ω Z 1/073

MISSION NO: SL-4
CREWMAN: (C)-(S)-(P)-
NAME: CARR/GIBSON/POGUE

	FLIGHT																											
EXP. REPETITION																												
MISSION DAY	4	4	4	5	5	5	5	5	5	5	5	5	5	6	6	6	6	6	6	6	6	6	7	7	7	7	7	
	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4
JULIAN DAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2
	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8
PROTOCOL							#3	#2	#3	#3		#3				#3		#3	#3		#3	#3		#3	#3		#3	
a. NOMINAL	/	/	/	/	/	/	/		/	/		/	/	/	/	/		/	/		/	/		/	/		/	/
b. UNSATISFACTORY																												
PROCEDURES																												
c. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
d. DEVIATED																												
CLINICAL FACTORS																												
e. NONE	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
f. SIGNIF. IMPACT																												
TIME REQUIRED																												
g. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
h. ABOVE NOMINAL																												
SAMPLE QUALITY								NOT AVAILABLE																				
i. SATISFACTORY																												
j. UNSATISFACTORY																												
SAMPLE QUANTITY								NOT AVAILABLE																				
k. SATISFACTORY							#5			#5					#4	#5		#5		#5			#5					
l. UNSATISFACTORY	#4														#4													
EXPERIMENT HARDWARE																												
m. SATISFACTORY	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
n. UNSATISFACTORY																												
DATA PROCESSING								NOT AVAILABLE																				
o. SATISFACTORY																												
p. UNSATISFACTORY																												
ANOMALIES/PROBLEMS																												
No. Documented	0	0	0	0	0	0	0		0	0		0	0	0	0	0		0	0		0	0		0	0		0	0
No. Closed																												
SUMMARY																												
ACCEPTABLE	/	/	/	/	/	/	/		/	/		/	/	/	/	/		/	/		/	/		/	/		/	/
UNACCEPTABLE																												

#2 - No Urine Measured or Sampled
#3 - 36 Hr. Pool & Sample
#4 - SPT's Sample not obtained

TABLE 3-1 (Cont'd)

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M Q Z 1/073

MISSION NO: SL-4
CREWMAN: (C)-(S)-(P)-
NAME: CARR/GIBSON/POGUE

	FLIGHT										POST-FLIGHT
EXP. REPETITION											
MISSION DAY	75	76	77	78	79	80	81	82	83	84	R+0 THRU R+18
JULIAN DAY	092	093	091	092	093	094	095	096	097	098	093 THRU 095
PROTOCOL				#3	#3		#3				
a. NOMINAL	/	/	/	/	/		/	/	/	/	
b. UNSATISFACTORY											
PROCEDURES											
c. NOMINAL	/	/	/	/	/	/	/	/	/	/	
d. DEVIATED											
CLINICAL FACTORS											
e. NONE	/	/	/	/	/	/	/	/	/	/	
f. SIGNIF. IMPACT											
TIME REQUIRED											
g. NOMINAL	/	/	/	/	/	/	/	/	/	/	
h. ABOVE NOMINAL											
SAMPLE QUALITY	NOT AVAILABLE										
i. SATISFACTORY											
j. UNSATISFACTORY											
SAMPLE QUANTITY	NOT AVAILABLE										
k. SATISFACTORY					#2						
l. UNSATISFACTORY											
EXPERIMENT HARDWARE											
m. SATISFACTORY	/	/	/	/	/	/	/	/	/	/	
n. UNSATISFACTORY											
DATA PROCESSING											
o. SATISFACTORY	NOT AVAILABLE										
p. UNSATISFACTORY											
ANOMALIES/PROBLEMS											
No. Documented	0	0	0	1		0	0				
No. Closed				1							
SUMMARY											
ACCEPTABLE	/	/	/	/		/	/	/			
UNACCEPTABLE											

DATA NOT AVAILABLE

#2 - No urine measured or sampled.
#3 - 36-hr. pool and sample.
* - UCTA used to return urine.

TABLE 3-1 (Cont'd)

M073 - BIOASSAY OF BODY FLUIDS

Preflight urine collections were accomplished satisfactorily for all crew members and the analyses have been completed. Four trays of urine and blood samples were received frozen from the SL-4 Command Module. These samples are still in the preparatory analysis stage. Post-flight collections are underway as planned.

Several inflight urine collection anomalies occurred inflight; however, they are not expected to degrade the experiment. On MD5, the SPT reported a leak in a large full sample bag. The SPT replaced the bag with the only spare available. The CDR's urine collection bag leaked on MD19 and caused approximately a 200 ml loss and forced a need for a volume determination from the lithium chloride additive. On MD62, the SPT's full sample bag broke and the sample was lost. On MD79, the PLT reported a 100cc spill when the boot on the urine collection bag failed.

To offset a possibility of losing frozen urine samples had the urine freezers malfunctioned, urine collection bags were charged with boric acid preservatives in pellet form. On MD16, the CDR reported undissolved pellets and expressed concern about getting solids in the dump lines. This was resolved as not being a problem, and probably due to boric acid concentrations being high in the immediate area of the disintegrating tablets. The same problem was reported by the SPT on MD22. Again, no further action was taken. The effect will be analyzed in the Endocrinology Laboratory with the returned sample.

The malfunctioning sample bags and the problem of insufficient spare created when the crew was unable to locate a complement of urine sample bags forced a compromise to the sampling schedule. It became necessary to implement a backup plan which alternated storage of 36-hour and 24-hour samples from the urine collection bags. The alternating schedule began on MD52 and extended for the remainder of the mission. Fourteen sets of crew urine samples were drawn from specific 36-hour collection periods. The modified schedule disrupted the planned ratio between full and one-half urine samples. Also, the rule requiring full urine samples on the days before, during, and after a blood draw was violated four times out of the eight blood draw days.

Urine specific gravity was measured coincident with the first four blood draws.

Table 3-2, a review of M073 specimen collection, has been consolidated into Table 3-1, M071.

M074-SMALL MASS MEASUREMENT DEVICE

One calibration was routinely performed. Subsequently, all cal. masses were lost except for the 500 gm. mass. Two subsequent calibrations were not possible and a single point was recorded using the 500 gm. mass.

Operation was routine until MD 81 when the elastomer specimen hold-down attachment failed on the "head" unit (the same failure occurred in SMEAT) and the mission was completed with the wardroom unit.

Table 3-3 contains a review of M074 data collection.

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M 0 7 4

MISSION NO: SL-4
CREWMAN: [redacted] - [redacted] - [redacted] -
NAME: N/A

	FLIGHT					
EXP. REPETITION						
MISSION DAY	041	112	129	213	421	17
JULIAN DAY	230	233	235	362	301	85
PROTOCOL	#1	#2	#3	#2	#3	#6
a. NOMINAL	/	/	/	/	/	/
b. UNSATISFACTORY						
PROCEDURES						
c. NOMINAL		/	/			
d. DEVIATED	/			/	/	/
CLINICAL FACTORS	← N/A →					
e. NONE						
f. SIGNIF. IMPACT						
TIME REQUIRED						
g. NOMINAL	/	/	/	/	/	/
h. ABOVE NOMINAL						
DATA QUALITY	← N/A →					
i. SATISFACTORY						
j. UNSATISFACTORY						
DATA QUANTITY	← N/A →					
k. SATISFACTORY						
l. UNSATISFACTORY						
EXPERIMENT HARDWARE						
m. SATISFACTORY	/	/	/	/	/	/
n. UNSATISFACTORY						
DATA PROCESSING						
o. SATISFACTORY	/	/	/	/	/	/
p. UNSATISFACTORY						
ANOMALIES/PROBLEMS				#4	#5	#5
No. Documented	1	0	0	1	0	0
No. Closed	1	0	0	1	0	0
SUMMARY						
ACCEPTABLE	/	/	/	/	/	/
UNACCEPTABLE						

#1 - Zero Cal only
#2 - Waste Mgmt. Area only
#3 - Wardroom area only
#4 - Lost all but 500 gm cal mass;0-500-0 cal
#5 - 0-500-0 Cal
#6 - Both facilities

TABLE 3-3

M078 - BONE MINERAL MEASUREMENT

Bone mineral content of the left os calcis and the right radius and ulna were measured on F-35, F-21, F-10, R+1, R+4 and scheduled for R+8. The results must await the R+8 data.

Table 3-4 contains a review of M078 data collection.

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M 0 7 8

MISSION NO: SL-4
CREWMAN: C - S - P -
NAME: ALL

	PRE-FLT	FLIGHT	POST-FLIGHT
EXP. REPETITION			
MISSION DAY			
JULIAN DAY	223 890 599	NONE	000 444 037
PROTOCOL			
a. NOMINAL	/		/
b. UNSATISFACTORY			
PROCEDURES			
c. NOMINAL	/		/
d. DEVIATED			
CLINICAL FACTORS			
e. NONE	/		/
f. SIGNIF. IMPACT			
TIME REQUIRED			
g. NOMINAL	N/A		N/A
h. ABOVE NOMINAL			
DATA QUALITY			
i. SATISFACTORY	/		/
j. UNSATISFACTORY			
DATA QUANTITY			
k. SATISFACTORY	/		/
l. UNSATISFACTORY			
EXPERIMENT HARDWARE			
m. SATISFACTORY	N/A		N/A
n. UNSATISFACTORY			
DATA PROCESSING			
o. SATISFACTORY	/	NOT AVAILABLE	
p. UNSATISFACTORY			
ANOMALIES/PROBLEMS			
No. Documented	N/A		N/A
No. Closed			
SUMMARY			
ACCEPTABLE	/		/
UNACCEPTABLE			

M092-LOWER BODY NEGATIVE PRESSURE

Twenty-two inflight tests were conducted with the CDR and SPT and twenty-three with the pilot as subjects.

Prior to beginning M092 runs on MD 5 each of the crewmen made daily left arm and left leg blood pressure measurements together with calf girth measurements of each leg. After the M092 runs began, leg blood pressure measurements were continued through MD 16 and were subsequently deleted by the PI unless a crew health requirement should arise.

After the first set of runs, the PLT, SPT and CDR had early run terminations at the -50 mmHg level on MD's 10, 14 and 16 respectively. While the absolute causes for these early terminations are not evident, it was suspected that the crew had been experiencing early mission fatigue together with zero-g cardiovascular adaptation.

Neither the CDR nor the PLT had any further M092 early protocol terminations; however, the SPT had two subsequent aborts on MD's 34 and 71. Each time these aborts occurred at -50 mmHg level and were attributed, at least in part, to fatigue caused by insufficient sleep.

During the time the workshop was experiencing high heat loads caused by peak sun exposure - between MD's 60 and 70, schedule adjustments were made to run M092's early in the day when internal OWS temperatures were lowest and within environmental performance constraints. Some compromises had to be made to circadian objectives. These temporary compromises do not appear to present any insurmountable analytical problems.

On MD 30, the M092 planning schedule was formally modified from 3^{+}_{-} 1-day intervals to 4^{+}_{-} 1-day intervals and effective through MD 56. This modification was necessary to accommodate high crew activity workloads. The reversion to the original scheduling interval occurred as planned.

As in prior missions, saddle positions had to be altered. The CDR, SPT, and PLT began the mission at saddle positions 7, 7, and 7, respectively. These were formally changed to 6, 6, and 6 on MD 23 and continued for the remainder of the mission.

On MD 10, the SPT's blood pressure measurements system stopped updating after the first few cycles. The crew was advised in real time. An onboard nitrogen valve was found closed. The valve was opened and the BPMS operated normally. Manual blood pressure readings were taken during this run.

During the PLT's M092 run on MD 13, the VCG y and z axes were not transmitted due to a procedural error with a tape recorder switch. These data were lost for the entire run. Also on MD 13, during the CDR's M092 run, the PLT reported a slow drift downward on the right leg band (AQ) calibration. This was corrected later by using the proper leg band and reference adapter combination. On MD's 30 and 31, the AQ right leg band displayed off-scale high on the front and end calibrations. Since this condition did not reappear on 17 subsequent runs. a procedural problem may have been responsible.

The AJ left leg band persistently exhibited off-scale high readings for the SPT and the PLT. The PI chose to change the calibration setting

on MD 53 to #2.0. The lowest setting the crew could use was #2.3 and that value was used for the PLT and SPT runs on MD's 53 and 54 respectively. Subsequently,the crew was advised to use calibration setting #2.5 which was more convenient operationally. This setting was used for the remaining mission duration and provided acceptable scale readings.

Ground data processing support was very good for the entire mission.

Table 3-5 contains a review of M092 data collection.

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M 0 9 2 — MISSION NO: SL-4
CREWMAN: (C)- S - P -
NAME: CARR

	PRE-FLT							FLIGHT																							
EXP. REPETITION	J	A	A	S	O	O	N																								
MISSION DAY	U	U	U	E	C	C	O	0	1	1	1	2	2	2	3	3	3	4	4	5	5	5	6	6	6	7	7				
	L	G	G	P	T	T	V	5	1	3	6	1	4	8	1	5	9	3	7	1	5	9	2	6	9	3	6				
JULIAN DAY	1	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0				
	8	1	4	6	8	9	1	2	3	3	3	4	4	4	5	5	5	6	0	0	0	1	1	2	2	2	3				
	7	3	0	9	5	9	0	4	0	2	5	0	3	7	0	4	8	2	1	5	9	3	6	0	3	7	0				
PROTOCOL																															
a. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/				
b. UNSATISFACTORY																															
PROCEDURES																															
c. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/				
d. DEVIATED																															
CLINICAL FACTORS																															
e. NONE	/	/	/	/	/	/	/	/	/	/		/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/				
f. SIGNIF. IMPACT											*																				
TIME REQUIRED																															
g. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/				
h. ABOVE NOMINAL																															
T/M QUALITY																															
i. SATISFACTORY	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/				
j. UNSATISFACTORY																															
T/M QUANTITY																															
k. SATISFACTORY	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/				
l. UNSATISFACTORY																															
EXPERIMENT HARDWARE																															
m. SATISFACTORY	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/				
n. UNSATISFACTORY																															
DATA PROCESSING																															
o. SATISFACTORY	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/				
p. UNSATISFACTORY																															
ANOMALIES/PROBLEMS																															
No. Documented	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0				
No. Closed															1																
SUMMARY																															
ACCEPTABLE	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/				
UNACCEPTABLE																															

*To be discussed in 30-Day Medical Report.

TABLE 3-5

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M092 — MISSION NO: SL-4
CREWMAN: (C)- S - P -
NAME: CARR

	FLIGHT	POSTFLIGHT
EXP. REPETITION	12	123456
MISSION DAY	78	000000
	93	012458
JULIAN DAY	00	000000
	33	344444
	37	901347
PROTOCOL		
a. NOMINAL	//	//////
b. UNSATISFACTORY		
PROCEDURES		
c. NOMINAL	//	//////
d. DEVIATED		
CLINICAL FACTORS		
e. NONE	//	//////
f. SIGNIF. IMPACT		
TIME REQUIRED		
g. NOMINAL	//	N/A
h. ABOVE NOMINAL		
T/M QUALITY		
i. SATISFACTORY	//	N/A
j. UNSATISFACTORY		
T/M QUANTITY		
k. SATISFACTORY	//	N/A
l. UNSATISFACTORY		
EXPERIMENT HARDWARE		
m. SATISFACTORY	//	//////
n. UNSATISFACTORY		
DATA PROCESSING		
o. SATISFACTORY	//	//////
p. UNSATISFACTORY		
ANOMALIES/PROBLEMS		
No. Documented	00	000000
No. Closed		
SUMMARY		
ACCEPTABLE	//	//////
UNACCEPTABLE		

TABLE 3-5 (Cont'd)

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M 0 9 2

MISSION NO: SL-4
CREWMAN: C -(S)- P -
NAME: GIBSON

	PRE-FLT							FLIGHT																							
EXP. REPETITION	J	J	A	S	O	O	N																								
MISSION DAY	U	U	U	E	C	C	O	0	1	1	1	2	2	2	3	3	3	4	4	5	5	5	6	6	6	7	7				
	N	L	G	P	T	T	V	6	0	4	8	0	3	7	0	4	8	2	6	0	4	8	1	5	8	1	5				
JULIAN DAY	1	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0				
	8	1	4	6	8	9	1	2	2	3	3	3	4	4	4	5	5	6	6	0	0	1	1	1	2	2	2				
	1	2	3	8	5	9	0	5	9	3	7	9	2	6	9	3	7	1	5	4	8	2	5	9	2	5	9				
PROTOCOL																															
a. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/				
b. UNSATISFACTORY																															
PROCEDURES																															
c. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/				
d. DEVIATED																															
CLINICAL FACTORS																															
e. NONE	/	/	/	/	/	/	/	/	/		/	/	/	/	/		/	/	/	/	/	/	/	/			/				
f. SIGNIF. IMPACT										*					*											*				
TIME REQUIRED																															
g. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/				
h. ABOVE NOMINAL																															
T/M QUALITY																															
i. SATISFACTORY	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/				
j. UNSATISFACTORY																															
T/M QUANTITY																															
k. SATISFACTORY	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/				
l. UNSATISFACTORY																															
EXPERIMENT HARDWARE																															
m. SATISFACTORY	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/				
n. UNSATISFACTORY																															
DATA PROCESSING																															
o. SATISFACTORY	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/				
p. UNSATISFACTORY																															
ANOMALIES/PROBLEMS																															
No. Documented	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0				
No. Closed															1																
SUMMARY																															
ACCEPTABLE	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/				
UNACCEPTABLE																															

*To be discussed in 30-Day Medical Report.

TABLE 3-5 (Cont'd)

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M 092 — MISSION NO: SL-4
CREWMAN: C -(S)- P -
NAME: GIBSON

	FLIGHT	POSTFLIGHT					
EXP. REPETITION		1	2	3	4	5	6
MISSION DAY	7 8 / 8 2	0	0	0	0	0	0
		0	1	2	4	5	8
JULIAN DAY	0 0 / 3 3 / 2 6	0	0	0	0	0	0
		3	4	4	4	4	4
		9	0	1	3	4	7
PROTOCOL							
a. NOMINAL	/ /	/	/	/	/	/	/
b. UNSATISFACTORY							
PROCEDURES							
c. NOMINAL	/ /	/	/	/	/	/	/
d. DEVIATED							
CLINICAL FACTORS							
e. NONE	/ /	/	/	/	/	/	/
f. SIGNIF. IMPACT							
TIME REQUIRED							
g. NOMINAL	/ /			N/A			
h. ABOVE NOMINAL							
T/M QUALITY							
i. SATISFACTORY	/ /			N/A			
j. UNSATISFACTORY							
T/M QUANTITY							
k. SATISFACTORY	/ /			N/A			
l. UNSATISFACTORY							
EXPERIMENT HARDWARE							
m. SATISFACTORY	/ /			N/A			
n. UNSATISFACTORY							
DATA PROCESSING							
o. SATISFACTORY	/ /	/	/	/	/	/	/
p. UNSATISFACTORY							
ANOMALIES/PROBLEMS							
No. Documented	0 0	0	0	0	0	0	0
No. Closed							
SUMMARY							
ACCEPTABLE	/ /	/	/	/	/	/	/
UNACCEPTABLE							

TABLE 3-5 (Cont'd)

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M 0 9 2 — MISSION NO: SL-4 — CREWMAN: C - S -(P)- — NAME: POGUE

	PRE-FLT							FLIGHT																					
EXP. REPETITION	J	J	A	S	O	O	N																						
MISSION DAY	U	U	U	E	C	C	O	0	1	1	1	1	2	2	2	3	3	4	4	4	5	5	6	6	6	7	7
	N	L	G	P	T	T	V	5	0	3	5	9	2	6	9	3	7	2	5	9	3	7	0	3	7	0	4
JULIAN DAY	1	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0
	8	1	4	6	8	9	1	2	2	3	3	3	4	4	4	5	5	6	6	0	0	1	1	1	2	2	2
	1	2	3	9	5	9	0	4	9	2	4	8	1	5	8	2	6	1	4	3	7	1	4	7	1	4	8
PROTOCOL																											
a. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
b. UNSATISFACTORY																											
PROCEDURES																											
c. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
d. DEVIATED																											
CLINICAL FACTORS																											
e. NONE	/	/	/	/	/	/	/	/		/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
f. SIGNIF. IMPACT									*																		
TIME REQUIRED																											
g. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
h. ABOVE NOMINAL																											
T/M QUALITY																											
i. SATISFACTORY	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
j. UNSATISFACTORY																											
T/M QUANTITY																											
k. SATISFACTORY	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
l. UNSATISFACTORY																											
EXPERIMENT HARDWARE																											
m. SATISFACTORY	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
n. UNSATISFACTORY																											
DATA PROCESSING																											
o. SATISFACTORY	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
p. UNSATISFACTORY																											
ANOMALIES/PROBLEMS																											
No. Documented	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
No. Closed										1							1										
SUMMARY																											
ACCEPTABLE	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
UNACCEPTABLE																											

*To be discussed in 30-Day Medical Report.

TABLE 3-5 (Cont'd)

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M 0 9 2

MISSION NO: SL-4
CREWMAN: C - S -(P)-
NAME: POGUE

	FLIGHT	POSTFLIGHT
EXP. REPETITION		1 2 3 4 5 6
MISSION DAY	7 8 8	0 0 0 0 0 0
	8 1 3	0 1 2 4 5 8
JULIAN DAY	0 0 0	0 0 0 0 0 0
	3 3 3	3 4 4 4 4 4
	2 5 7	9 0 1 3 4 7
PROTOCOL		
a. NOMINAL	/ / /	/ / / / / /
b. UNSATISFACTORY		
PROCEDURES		
c. NOMINAL	/ / /	/ / / / / /
d. DEVIATED		
CLINICAL FACTORS		
e. NONE	/ / /	/ / / / / /
f. SIGNIF. IMPACT		
TIME REQUIRED		
g. NOMINAL	/ / /	N/A
h. ABOVE NOMINAL		
T/M QUALITY		
i. SATISFACTORY	/ / /	N/A
j. UNSATISFACTORY		
T/M QUANTITY		
k. SATISFACTORY	/ / /	N/A
l. UNSATISFACTORY		
EXPERIMENT HARDWARE		
m. SATISFACTORY	/ / /	N/A
n. UNSATISFACTORY		
DATA PROCESSING		
o. SATISFACTORY	/ / /	/ / / / / /
p. UNSATISFACTORY		
ANOMALIES/PROBLEMS		
No. Documented	0 0 0	0 0 0 0 0 0
No. Closed		
SUMMARY		
ACCEPTABLE	/ / /	/ / / / / /
UNACCEPTABLE		

TABLE 3-5 (Cont'd)

M093 - VECTORCARDIOGRAM

M093 was conducted independently nine times by original protocol and twelve times in conjunction with M171 on each crewman. The procedure for using M171 was an MRD option which was exercised by the Science Planning Team.

No operational events occurred which interferred with the collection of VCG data during scheduled M093 runs and in conjunction with M171 runs.

Table 3-6 contains a review of M093 data collection.

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M 0 9 3

MISSION NO: SL-4
CREWMAN: (C)- S - P -
NAME: CARR

	PRE-FLT			FLIGHT									POST-FLIGHT	
EXP. REPETITION	0	0	0	1	2	3	4	5	6	7	8	9	1	2
MISSION DAY	CT	CT	CT	11	16	24	31	47	55	62	69	76	01	06
JULIAN DAY	288	292	295	330	335	343	350	001	009	016	023	030	004	045
PROTOCOL														
a. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/
b. UNSATISFACTORY														
PROCEDURES														
c. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/
d. DEVIATED														
CLINICAL FACTORS														
e. NONE	/	/	/	/	/	/	/	/	/	/	/	/	/	/
f. SIGNIF. IMPACT														
TIME REQUIRED														
g. NOMINAL		N/A		/	/	/	/	/	/	/	/	/	N/A	
h. ABOVE NOMINAL														
T/M QUALITY														
i. SATISFACTORY		N/A		/	/	/	/	/	/	/	/	/	N/A	
j. UNSATISFACTORY														
T/M QUANTITY														
k. SATISFACTORY		N/A		/	/	/	/	/	/	/	/	/	N/A	
l. UNSATISFACTORY														
EXPERIMENT HARDWARE														
m. SATISFACTORY	/	/	/	/	/	/	/	/	/	/	/	/	N/A	
n. UNSATISFACTORY														
DATA PROCESSING														
o. SATISFACTORY	/	/	/	/	/	/	/	/	/	/	/	/	/	/
p. UNSATISFACTORY														
ANOMALIES/PROBLEMS														
No. Documented	0	0	0	0	0	0	0	0	0	0	0	0	N/A	
No. Closed														
SUMMARY														
ACCEPTABLE	/	/	/	/	/	/	/	/	/	/	/	/	/	/
UNACCEPTABLE														

TABLE 3-6

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M 0 9 3 ALT. 171 — MISSION NO: SL-4
CREWMAN: (C) - S - P -
NAME: CARR

	PRE-FLT								FLIGHT												POST-FLIGHT					
EXP. REPETITION	J	J	A	A	S	0	0	N	1	2	3	4	5	6	7	8	9	0	1	2	1	2	3	4	5	6
MISSION DAY	U	U	U	U	E	C	C	0	0	1	2	2	3	4	5	5	6	7	7	8	0	0	0	0	0	0
	N	L	G	G	P	T	T	V	5	3	1	8	5	3	1	9	6	3	9	3	0	1	2	4	5	8
JULIAN DAY	1	1	2	2	2	2	2	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0
	5	8	1	4	6	8	9	1	2	3	4	4	5	6	0	1	2	2	3	3	3	4	4	4	4	4
	2	7	3	0	9	5	9	0	4	2	0	7	4	2	5	3	0	7	3	7	9	0	1	3	4	7
PROTOCOL																										
a. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
b. UNSATISFACTORY																										
PROCEDURES																										
c. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/		/	/	/	/	/	/	/	/	/	/	/	/	/
d. DEVIATED																										
CLINICAL FACTORS																										
e. NONE	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
f. SIGNIF. IMPACT																										
TIME REQUIRED																										
g. NOMINAL	←	←	←	N/A	→	→	→	→	/	/	/	/	/	/	/	/	/	/	/	/	←	←	←	N/A	→	→
h. ABOVE NOMINAL																										
T/M QUALITY																										
i. SATISFACTORY	←	←	←	N/A	→	→	→	→	/	/	/	/	/	/	/	/	/	/	/	/	←	←	←	N/A	→	→
j. UNSATISFACTORY																										
T/M QUANTITY																										
k. SATISFACTORY	←	←	←	N/A	→	→	→	→	/	/	/	/	/	/	/	/	/	/	/	/	←	←	←	N/A	→	→
l. UNSATISFACTORY																										
EXPERIMENT HARDWARE																										
m. SATISFACTORY	←	←	←	N/A	→	→	→	→	/	/	/	/	/	/	/	/	/	/	/	/	←	←	←	N/A	→	→
n. UNSATISFACTORY																										
DATA PROCESSING																										
o. SATISFACTORY	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
p. UNSATISFACTORY																										
ANOMALIES/PROBLEMS																										
No. Documented	←	←	←	N/A	→	→	→	→	0	0	0	0	0	0	0	0	0	0	0	0	←	←	←	N/A	→	→
No. Closed																										
SUMMARY																										
ACCEPTABLE	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
UNACCEPTABLE																										

TABLE 3-6 (Cont'd)

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M 093 — MISSION NO: SL-4
CREWMAN: C - (S) - P -
NAME: GIBSON

	PRE-FLT			FLIGHT									POST-FLIGHT	
EXP. REPETITION	0	0	0	1	2	3	4	5	6	7	8	9	1	2
MISSION DAY	C	C	C	1	1	2	3	4	5	6	6	7	0	0
	T	T	T	0	8	3	0	6	4	1	8	5	1	6
JULIAN DAY	2	2	2	3	3	3	3	3	0	0	0	0	0	0
	8	9	9	2	3	4	4	6	0	1	2	2	4	4
	8	2	5	9	7	2	9	5	8	5	2	9	0	5
PROTOCOL														
a. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/
b. UNSATISFACTORY														
PROCEDURES														
c. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/
d. DEVIATED														
CLINICAL FACTORS														
e. NONE	/	/	/	/	/	/	/	/	/	/	/	/	/	/
f. SIGNIF. IMPACT														
TIME REQUIRED														
g. NOMINAL		N	/A	/	/	/	/	/	/	/	/	/	N	/A
h. ABOVE NOMINAL														
T/M QUALITY														
i. SATISFACTORY		N	/A	/	/	/	/	/	/	/	/	/	N	/A
j. UNSATISFACTORY														
T/M QUANTITY														
k. SATISFACTORY		N	/A	/	/	/	/	/	/	/	/	/	N	/A
l. UNSATISFACTORY														
EXPERIMENT HARDWARE														
m. SATISFACTORY		N	/A	/	/	/	/	/	/	/	/	/	N	/A
n. UNSATISFACTORY														
DATA PROCESSING														
o. SATISFACTORY	/	/	/	/	/	/	/	/	/	/	/	/	/	/
p. UNSATISFACTORY														
ANOMALIES/PROBLEMS														
No. Documented		N	/A	0	0	0	0	0	0	0	0	0	N	/A
No. Closed														
SUMMARY														
ACCEPTABLE	/	/	/	/	/	/	/	/	/	/	/	/	/	/
UNACCEPTABLE														

TABLE 3-6 (Cont'd)

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M 0 9 3 ALT. 171 MISSION NO: SL-4
CREWMAN: C -(S)- P -
NAME: GIBSON

	PRE-FLT								FLIGHT											POST-FLIGHT					
EXP. REPETITION	J	J	J	A	S	O	O	N	1	2	3	4	5	6	7	8	9	0	1	2	1	2	3	4	5	6
MISSION DAY	U	U	U	U	E	C	C	O	0	1	2	2	3	4	5	5	6	7	7	8	0	0	0	0	0	0
	N	N	L	G	P	T	T	V	6	5	0	7	4	2	0	8	5	1	8	2	0	1	2	4	5	8
JULIAN DAY	1	1	2	2	2	2	2	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0
	7	8	1	4	6	8	9	1	2	3	3	4	5	6	0	1	1	2	3	3	3	4	4	4	4	4
	8	1	2	3	8	5	9	0	5	4	9	6	3	1	4	2	9	5	2	6	9	0	1	3	4	7
PROTOCOL																										
a. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
b. UNSATISFACTORY																										
PROCEDURES																										
c. NOMINAL	/	/	/	/	/	/	/	/	/	*	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
d. DEVIATED																										
CLINICAL FACTORS																										
e. NONE	/	/	/	/	/	/	/	/	/	/	/	/		/	/	/	/	/	/		/	/	/	/	/	/
f. SIGNIF. IMPACT																										
TIME REQUIRED																										
g. NOMINAL	←			N/A				→	/	/	/	/	/	/		/	/	/	/	/	←			N/A		→
h. ABOVE NOMINAL																										
T/M QUALITY																										
i. SATISFACTORY	←			N/A				→	/		/	/	/	/		/	/	/	/	/	←			N/A		→
j. UNSATISFACTORY										/																
T/M QUANTITY																										
k. SATISFACTORY	←			N/A				→	/		/	/	/	/		/	/	/	/	/	←			N/A		→
l. UNSATISFACTORY										/																
EXPERIMENT HARDWARE																										
m. SATISFACTORY	←			N/A				→	/	/	/	/	/	/		/	/	/	/	/	←			N/A		→
n. UNSATISFACTORY																										
DATA PROCESSING																										
o. SATISFACTORY	/	/	/	/	/	/	/	/	/		/	/	/	/		/	/	/	/	/	/	/	/	/	/	/
p. UNSATISFACTORY										/																
ANOMALIES/PROBLEMS																										
No. Documented	←			N/A				→	0	0	0	0	0	0	0	0	0	0	0	0	←			N/A		→
No. Closed																										
SUMMARY																										
ACCEPTABLE	/	/	/	/	/	/	/	/	/		/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
UNACCEPTABLE										/																

TABLE 3-6 (Cont'd)

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M 0 9 3

MISSION NO: SL-4
CREWMAN: C - S -(P)-
NAME: POGUE

	PRE-FLT			FLIGHT										POST-FLIGHT	
EXP. REPETITION	0	0	0	1	2	3	4	5	6	7	8	9		1	2
MISSION DAY	C	C	C	1	1	2	2	4	5	6	6	7		0	0
	T	T	T	0	5	2	9	5	3	0	7	4		1	6
JULIAN DAY	2	2	2	3	3	3	3	3	0	0	0	0		0	0
	8	9	9	2	3	4	4	6	0	1	2	2		4	4
	8	2	5	9	4	1	8	4	7	4	1	8		0	5
PROTOCOL															
a. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/		/	/
b. UNSATISFACTORY														/	/
PROCEDURES															
c. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/		/	/
d. DEVIATED														/	/
CLINICAL FACTORS															
e. NONE	/	/	/	/	/	/	/	/	/	/	/	/		/	/
f. SIGNIF. IMPACT															
TIME REQUIRED															
g. NOMINAL		N	/A	/	/	/	/	/	/	/	/	/		N	/A
h. ABOVE NOMINAL															
T/M QUALITY															
i. SATISFACTORY		N	/A	/	/	/	/	/	/	/	/	/		N	/A
j. UNSATISFACTORY															
T/M QUANTITY															
k. SATISFACTORY		N	/A	/	/	/	/	/	/	/	/	/		N	/A
l. UNSATISFACTORY															
EXPERIMENT HARDWARE															
m. SATISFACTORY		N	/A	/	/	/	/	/	/	/	/	/		N	/A
n. UNSATISFACTORY															
DATA PROCESSING															
o. SATISFACTORY	/	/	/	/	/	/	/	/	/	/	/	/		/	/
p. UNSATISFACTORY															
ANOMALIES/PROBLEMS															
No. Documented		N	/A	0	0	0	0	0	0	0	0	0		N	/A
No. Closed															
SUMMARY															
ACCEPTABLE	/	/	/	/	/	/	/	/	/	/	/	/		/	/
UNACCEPTABLE															

TABLE 3-6 (Cont'd)

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M 093 ALT. 171 MISSION NO: SL-4
CREWMAN: C - S -(P)-
NAME: POGUE

	PRE-FLT								FLIGHT												POST-FLIGHT					
EXP. REPETITION	J	J	J	A	S	O	O	N	1	2	3	4	5	6	7	8	9	0	1	3d	1	2	3	4	5	6
MISSION DAY	U	U	U	U	E	C	C	O	0	1	1	2	3	4	4	5	6	7	7	8	0	0	0	0	0	0
	N	N	L	G	P	T	T	V	5	3	9	6	3	2	9	7	3	0	8	3	0	1	2	4	5	8
JULIAN DAY	1	1	2	2	2	2	2	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0
	5	8	1	4	6	8	9	1	2	3	3	4	5	6	0	1	1	2	3	3	3	4	4	4	4	4
	2	1	2	3	9	5	9	0	4	2	8	5	2	1	3	1	7	4	2	7	9	0	1	3	4	7
PROTOCOL																										
a. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
b. UNSATISFACTORY																										
PROCEDURES																										
c. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
d. DEVIATED																										
CLINICAL FACTORS																										
e. NONE	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
f. SIGNIF. IMPACT																										
TIME REQUIRED																										
g. NOMINAL	←			N/A				→	/	/	/	/	/	/	/	/	/	/	/	/	←			N/A		→
h. ABOVE NOMINAL																										
T/M QUALITY																										
i. SATISFACTORY	←			N/A				→	/	/	/	/	/	/	/	/	/	/	/	/	←			N/A		→
j. UNSATISFACTORY																										
T/M QUANTITY																										
k. SATISFACTORY	←			N/A				→	/	/	/	/	/	/	/		/	/	/	/	←			N/A		→
l. UNSATISFACTORY																*										
EXPERIMENT HARDWARE																										
m. SATISFACTORY	←			N/A				→	/	/	/	/	/	/	/	/	/	/	/	/	←			N/A		→
n. UNSATISFACTORY																										
DATA PROCESSING																										
o. SATISFACTORY	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/		/	/	/	/	/
p. UNSATISFACTORY																										
ANOMALIES/PROBLEMS																										
No. Documented	←			N/A				→	0	0	0	0	0	0	0	1	0	0	0	0	←			N/A		→
No. Closed																1										
SUMMARY																										
ACCEPTABLE	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/		/	/	/	/	/
UNACCEPTABLE																										

*Bad Electrode Connection

TABLE 3-6 (Cont'd)

M110 SERIES - HEMATOLOGY AND IMMUNOLOGY

Inflight blood samples were collected from each crewman on Mission Days 3, 5, 21, 38, 45, 58, 74, and 82. At the time of this report, the blood samples are still in the urine trays and have not been examined.

Hemoglobin determinations were made after every blood draw except the last. One additional finger stick measurement was made on MD 62. Laboratory evaluations will be made of the inflight blood specimens for comparisons with the inflight hemoglobin measurements.

There were some minor problem hemolyzing blood during the initial draws and this could have affected the amount and purity of samples returned. Detailed information should be available about day R+14, after the blood samples are examined.

One blood spacer was faulty and would not hold the ASP. This problem did not have any effect on the blood sample quantity or quality.

Table 3-7 contains a review of the M110 series data collection.

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M 1 1 0

MISSION NO: SL-4
CREWMAN: C - S - P -
NAME: ALL

	PRE-FLT						FLIGHT										POST-FLIGHT			
EXP. REPETITION	1	2	3	4	5	6	1	2	3	4	5	6	7	8			1	2	3	4
MISSION DAY							0	0	2	3	4	5	7	8			0	0	0	0
							3	5	1	8	5	9	4	2	R	+	0	1	3	7
JULIAN DAY	2	2	3	3	3	3	3	3	3	3	3	0	0	0			0	0	0	0
	8	9	0	0	1	1	2	2	4	5	6	1	2	3			3	4	4	4
	5	9	0	6	4	9	2	4	0	7	4	3	8	6			9	0	2	6
PROTOCOL																				
a. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/			/	/	/	/
b. UNSATISFACTORY																				
PROCEDURES																				
c. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/			/	/	/	/
d. DEVIATED																				
CLINICAL FACTORS																				
e. NONE	/	/	/	/	/	/	/	/	/	/	/	/	/	/			/	/	/	/
f. SIGNIF. IMPACT																				
TIME REQUIRED																				
g. NOMINAL	←		N/A		→		/	/	/	/	/	/	/	/			—	N/A		→
h. ABOVE NOMINAL																				
SAMPLE QUALITY																				
i. SATISFACTORY	←		N/A		→		NOT AVAILABLE										←	N/A		→
j. UNSATISFACTORY																				
SAMPLE QUANTITY																				
k. SATISFACTORY	/	/	/	/	/	/	NOT AVAILABLE										/	/	/	/
l. UNSATISFACTORY																				
EXPERIMENT HARDWARE																				
m. SATISFACTORY	←		N/A		→		/	/	/	/	/	/	/	/			←	N/A		→
n. UNSATISFACTORY																				
DATA PROCESSING																				
o. SATISFACTORY	/	/	/	/	/	/	NOT AVAILABLE										NOT AVAILABLE			
p. UNSATISFACTORY																				
ANOMALIES/PROBLEMS																				
No. Documented	←		N/A		→		0	0	0	0	1	0	0	0	0		←	N/A		→
No. Closed											1									
SUMMARY																				
ACCEPTABLE	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/		NOT AVAILABLE			
UNACCEPTABLE																				

TABLE 3-7

M131-HUMAN VESTIBULAR FUNCTION

Preflight data of sufficient quality and quantity were obtained on each of the SL-4 crewmen on all portions of the M131 experiment. These included measurements of semicircular canal response thresholds by means of the oculogyral illusion (OGI) basic susceptibility to motion sickness (MS) and spatial localization (SL).

Upon initial entry into weightlessness two of the crewmen experienced symptoms indicative of motion sickness with the most severe symptoms being manifested by the PLT. The CDR reported only a mild pre-meal epigastric awareness. Complete recovery from these symptoms occurred after approximately mission day 4 and from that point on all crewmen were dramatically free of symptoms as normally provoked by the M131 MS test protocol. By MD 12 all crewmen were able to perform the maximum required number of head movements (150) at the maximum rotating chair RPM (30) with no symptomatology. After MD 20 all MS testing was discontinued and not resumed again until approximately MD 73 at which time a special MS was conducted. This test required each crewman to first rotate CW for 150 head movements at 30 RPM and then immediately repeat the protocol with the direction of chair rotation reversed (i.e., CCW). The complete CW/CCW protocol was performed by all crewmen with no symptoms reported. During the mission a total of five MS tests were performed by the CDR and four each were performed by the SPT and PLT. (The special CW/CCW is considered one test.) A total of seven MS tests had been originally scheduled for each crewman

during the mission. On the OGI portion of the experiment the CDR's performance was very stable and he demonstrated a slight increase in ability to detect the illusion relative to preflight baseline performance. Relative to their preflight performance both the SPT and PLT demonstrated greater variability and a decrease in their ability to perceive the illusion. The greatest change was manifested by the PLT. Each of the crewmen performed a total of six successful OGI tests during the mission. A total of seven each had been originally scheduled.

As scheduled, a total of three complete SL tests were performed by each crewman. Preliminary analysis of these data indicate slight shifts in localization and slight changes in variability relative to preflight measurements.

When tested for post flight susceptibility to motion sickness in the rotating chair on R+1, R+2, and R+5, none of the crewmen experienced any significant symptoms. (All tests were at 30 RPM.) Additional tests will be required to determine the time course and completeness of return to preflight levels of susceptibility. As of this time, no significant changes relative to preflight baselines have been noted with either the OGI or SL tests; these tests, however, are not complete.

Table 3-8 contains a review of M131 data collection.

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M 1 3 1-1 and M131-2 — MISSION NO: SL-4 — CREWMAN: (C)- S - P - — NAME: CARR

	PRE-FLT				FLIGHT												POST-FLIGHT					
EXP. REPETITION	A	0	0	N	1	2	3	4	5	6	7	1	2	3			1	2	3	4	1	2
MISSION DAY	P	C	C	0	0	1	1	2	4	6	7	1	3	7			0	0	0	0	0	0
	R	T	T	V	8	1	9	6	7	0	3	5	6	5			1	2	4	8	4	8
JULIAN DAY	0	2	2	3	3	3	3	3	0	0	0	3	3	0			0	0	0	0	0	0
	9	9	9	1	2	3	3	4	0	1	2	3	5	2			4	4	4	4	4	4
	9	4	9	0	7	0	8	5	1	4	7	4	5	9			0	1	3	7	3	7
PROTOCOL M131-1MS	/	/	/	/	/	/	/	/			/						/	/	/	/		
M131-1OGI					/	/	/	/	/	/							/	/	/	/		
M131-2												/	/	/							/	/
PROCEDURES																						
c. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/			/	/	/	/	/	/
d. DEVIATED											*											
CLINICAL FACTORS																						
e. NONE	/	/	/	/	/	/	/	/	/	/	/	/	/	/			/	/	/	/	/	/
f. SIGNIF. IMPACT																						
TIME REQUIRED																						
g. NOMINAL	← N/A →				/	/	/	/	/	/	/	/	/	/			/	/	/	/	/	/
h. ABOVE NOMINAL																						
DATA QUALITY																						
i. SATISFACTORY	← N/A →				/	/	/	/	/	/	/	/	/	/			← N/A →					
j. UNSATISFACTORY																						
DATA QUANTITY																						
k. SATISFACTORY	← N/A →				/	/	/	/	/	/	/	/	/	/								
l. UNSATISFACTORY																						
EXPERIMENT HARDWARE																						
m. SATISFACTORY	← N/A →				/	/	/	/	/	/	/	/	/	/			← N/A →					
n. UNSATISFACTORY																						
DATA PROCESSING																						
o. SATISFACTORY	/	/	/	/	/	/	/	/	/	/	/	/	/	/			/	/	/	/	/	/
p. UNSATISFACTORY																						
ANOMALIES/PROBLEMS																						
No. Documented	← N/A →				0	0	0	0	0	0	0	0	0	0			← N/A →					
No. Closed																						
SUMMARY																						
ACCEPTABLE	/	/	/	/	/	/	/	/	/	/	/	/	/	/			/	/	/	/	/	/
UNACCEPTABLE																						

*Special Double MS Run (CW + CCW Rotation)

TABLE 3-8

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M 1 3 1-1 and M131-2

MISSION NO: SL-4
CREWMAN: C -(S)- P -
NAME: GIBSON

	PRE-FLT					FLIGHT										POST-FLIGHT					
EXP. REPETITION	A	J	A	S	N	1	1	2	3	4	4		1	2	3	1	2	3	4	1	2
MISSION DAY	P	U	U	E	0	0	0	1	2	4	6	7	8	1	3	7	0	0	0	0	0	0
	R	L	G	P	V	6	8	2	6	7	2	4	1	6	6	6	1	2	4	8	4	8
JULIAN DAY	0	1	2	2	3	3	3	3	3	0	0	0	0	3	3	0	0	0	0	0	0	0
	9	9	2	5	1	2	2	3	4	0	1	2	3	3	5	3	4	4	4	4	4	4
	9	0	1	3	0	5	7	1	5	1	6	8	5	5	5	0	0	1	3	7	3	7
PROTOCOL M131-1 MS	/	/	/	/	/	/		/	/			/					/	/	/	/		
M131-1OGI							/	/	/	/	/		/				/	/	/	/		
M131-2														/	/	/					/	/
PROCEDURES																						
c. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
d. DEVIATED												*										
CLINICAL FACTORS																						
e. NONE	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
f. SIGNIF. IMPACT																						
TIME REQUIRED																						
g. NOMINAL	← N/A →																← N/A →					
h. ABOVE NOMINAL																						
DATA QUALITY																						
i. SATISFACTORY	← N/A →					/	/	/	/	/	/	/	/	/	/	/	← N/A →					
j. UNSATISFACTORY																						
DATA QUANTITY																						
k. SATISFACTORY	← N/A →					/	/	/	/	/	/	/	/	/	/	/	← N/A →					
l. UNSATISFACTORY																						
EXPERIMENT HARDWARE																						
m. SATISFACTORY	← N/A →					/	/	/	/	/	/	/	/	/	/	/	← N/A →					
n. UNSATISFACTORY																						
DATA PROCESSING																						
o. SATISFACTORY	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
p. UNSATISFACTORY																						
ANOMALIES/PROBLEMS																						
No. Documented	← N/A →					0	0	0	0	0	0	0	0	0	0	0	← N/A →					
No. Closed																						
SUMMARY																						
ACCEPTABLE	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
UNACCEPTABLE																						

*Special Double MS Run (CW + CCW Rotation).

TABLE 3-8 (Cont'd)

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M131-1 and M131-2

MISSION NO: SL-4
CREWMAN: C - S -(P)-
NAME: POGUE

	PRE-FLT						FLIGHT												POST-FLIGHT					
EXP. REPETITION	A	J	A	S	0		1	1	2	3	4		4						1	2	3	4		1	2
MISSION DAY	P	U	U	E	C		0	0	1	2	4	6	7	8		1	3	7	0	0	0	0		0	0
	R	L	G	P	T		6	8	2	8	9	2	3	1		6	6	5	1	2	4	8		4	8
JULIAN DAY	0	1	2	2	2		3	3	3	3	0	0	0	0		3	3	0	0	0	0	0		0	0
	9	9	2	5	9		2	2	3	4	0	1	2	3		3	5	2	4	4	4	4		4	4
	9	0	1	3	9		5	7	1	7	3	6	7	5		5	5	9	0	1	3	7		3	7
PROTOCOL M131-1MS	/	/	/	/	/		/		/	/			/						/	/	/	/			
M131-1OGI								/	/	/	/	/		/					/	/	/	/			
M131-2																/	/	/						/	/
PROCEDURES																									
c. NOMINAL	/	/	/	/	/		/	/	/	/	/	/	/	/		/	/	/		/	/	/		/	/
d. DEVIATED													*												
CLINICAL FACTORS																									
e. NONE	/	/	/	/	/		/	/	/	/	/	/	/	/		/	/	/		/	/	/		/	/
f. SIGNIF. IMPACT																									
TIME REQUIRED																									
g. NOMINAL	←	N/A			→		/	/	/	/	/	/	/	/		/	/	/	←		N/A		→		
h. ABOVE NOMINAL																									
DATA QUALITY																									
i. SATISFACTORY	←	N/A			→		/	/	/	/	/	/	/	/		/	/	/	←		N/A		→		
j. UNSATISFACTORY																									
DATA QUANTITY																									
k. SATISFACTORY	←	N/A			→		/	/	/	/	/	/	/	/		/	/	/	←		N/A		→		
l. UNSATISFACTORY																									
EXPERIMENT HARDWARE																									
m. SATISFACTORY	←	N/A			→		/	/	/	/	/	/	/	/		/	/	/	←		N/A		→		
n. UNSATISFACTORY																									
DATA PROCESSING																									
o. SATISFACTORY	/	/	/	/	/		/	/	/	/	/	/	/	/		/	/	/		/	/	/		/	/
p. UNSATISFACTORY																									
ANOMALIES/PROBLEMS																									
No. Documented	←	N/A			→		0	0	0	0	0	0	0	0		0	0	0	←		N/A		→		
No. Closed																									
SUMMARY																									
ACCEPTABLE	/	/	/	/	/		/	/	/	/	/	/	/	/		/	/	/		/	/	/		/	/
UNACCEPTABLE																									

*Special Double MS run (CW + CCW Rotation).

TABLE 3-8 (Cont'd)

M133-SLEEP MONITORING

The M133 Sleep Monitoring experiment was performed three times preflight, 18 times during the SL4 flight, and three times post flight by the Scientist-Pilot. On 17 of the inflight sleep monitoring nights satisfactory real-time data was obtained. On one night (MD 50), faulty data transmission resulted in the loss of approximately 75 percent of the real-time data for that night. Magnetic tape recordings were made of each inflight performance and these tapes were returned for post flight analysis by the Principal Investigator.

The M133 experiment was originally approved for SL-2 and SL-3 only, but was added to the SL-4 mission by the Flight Management Team approximately one month prior to the SL-4 launch. As only nine caps were available onboard, the experiment was approved for eight performances on the SL-4 flight; however, initial tests conducted by the SPT demonstrated that the caps could be reused successfully several times. As a result of these inflight tests, the FMT approved 10 additional inflight experiment performances.

The analysis of the SL-2 and SL-3 tapes confirmed that Tape Recorder #1 became inoperative during the SL-2 mission. Therefore, on the SL-4 mission, all inflight data were recorded on Tape Recorder #2 only. This necessitated a changeout of the magnetic tape by the SPT at the midpoint of the SL-4 flight.

Table 3-9 contains a review of M133 data collection.

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M 1 3 3

MISSION NO: SL-4
CREWMAN: C -(S)- P -
NAME: GIBSON

	PRE-FLT				FLIGHT																			POST-FLIGHT		
EXP. REPETITION					1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8		1	2	3
MISSION DAY	1	1	1		0	0	1	1	1	2	2	3	4	4	5	5	6	7	7	8	8	8		0	0	0
	3	2	1		3	4	0	4	9	4	9	4	0	5	0	5	0	2	7	0	1	2		0	1	5
JULIAN DAY	3	3	3		3	3	3	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0		0	0	0
	0	0	0		2	2	2	3	3	4	4	5	5	6	0	0	1	2	8	3	3	3		3	4	4
	7	8	9		2	3	9	3	8	3	8	3	9	4	4	9	4	6	0	4	5	6		9	0	4
PROTOCOL																										
a. NOMINAL	/	/	/		/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/		/	/	/
b. UNSATISFACTORY																										
PROCEDURES																										
c. NOMINAL	/	/	/		/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/		/	/	/
d. DEVIATED																										
CLINICAL FACTORS																										
e. NONE	/	/	/		/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/		/	/	/
f. SIGNIF. IMPACT																										
TIME REQUIRED																										
g. NOMINAL	N/A														N/A											
h. ABOVE NOMINAL																										
TM QUALITY																										
i. SATISFACTORY	/	/	/		/	/	/	/	/	/	/	/	/	/		/	/	/	/	/	/	/		/	/	/
j. UNSATISFACTORY															/											
TM QUANTITY																										
k. SATISFACTORY	/	/	/			/	/	/	/	/	/	/	/	/		/	/	/		/	/	/		/	/	/
l. UNSATISFACTORY					/										/				/							
EXPERIMENT HARDWARE																										
m. SATISFACTORY	/	/	/		/	/	/	/	/	/	/	/	/	/		/	/	/	/	/	/	/		/	/	/
n. UNSATISFACTORY															/											
DATA PROCESSING																										
o. SATISFACTORY	/	/	/		/	/	/	/	/	/	/	/	/	/		/	/	/	/	/	/	/		/	/	/
p. UNSATISFACTORY																										
ANOMALIES/PROBLEMS					#1										#2											
No. Documented	0	0	0		1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0		0	0	0
No. Closed					1										1											
SUMMARY																										
ACCEPTABLE	/	/	/		/	/	/	/	/	/	/	/	/	/		/	/	/	/	/	/	/		/	/	/
UNACCEPTABLE																										

NOTES: #1 - Lost hour of data due to loose electrode.
#2 - Only received 2 hrs. of telemetry but tape may have good data.

TABLE 3-9

M151-TIME AND MOTION STUDY

Based on real-time crew reports, all but one inflight M151 requirement were satisfied. The lost filming performance was on an M509 Astronaut Maneuvering Unit activity. With the crew's cooperation, four additional photographic sessions were completed on combinations of M092/M093/M171 after Flight Management Team approval on MD 61.

There were some problems accomplishing the M151 schedule. The problems always arose from the cameras or the film transporters. Failures of either one of these devices occurred on Mission Days 6, 7, 14, 16, 20, 22, 23, 30, 33, and 45 and necessitated rescheduling M151 planned for those days.

On MD 27, plans were abandoned to photograph S183 and additional Earth Terrain Camera preparations were substituted for a total of seven runs.

All photographic data are being processed and no film quality assessments or analytical data are available for this report.

Table 3-10 contains a review of M151 data collection.

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M151
M092/M171 PREPS

MISSION NO: SL-4
CREWMAN: C - S - P -
NAME: SEE BELOW

	(1973) PRE-FLIGHT															FLIGHT							
EXP. REPETITION	N	J	J	J	M	M	J	J	A	A	A	S	S	O	1	2	3	4	5	6	7	8
MISSION DAY	O	A	A	A	A	A	U	U	U	U	U	E	E	C	0	0	0	1	1	2	2	3
	V	N	N	N	Y	Y	N	L	G	G	G	P	P	T	5	5	6	0	1	0	2	4
JULIAN DAY (1972)		0	0	0	1	1	1	1	2	2	2	2	2	3	3	3	3	3	3	3	3	3
		1	1	1	3	5	8	8	1	4	4	6	6	0	2	2	2	2	3	3	4	5
		1	2	5	6	1	1	7	8	0	3	8	9	2	4	4	5	9	0	9	1	3
PROTOCOL		M092 SUBJECT CREWMAN →													P	C	S	S	C	S	P	S
a. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
b. UNSATISFACTORY															*							
PROCEDURES																						
c. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
d. DEVIATED																						
CLINICAL FACTORS																						
e. NONE	—	—	—	—	N/A	—	—	—	—	—	—	—	—	—	—	—	—	N/A	—	—	—	—
f. SIGNIF. IMPACT																						
TIME REQUIRED																						
g. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
h. ABOVE NOMINAL																						
FILM QUALITY																						
i. SATISFACTORY	/	/	/	/	/	/	/	/	/	/	/	/	/	/	NOT AVAILABLE							
j. UNSATISFACTORY																						
FILM QUANTITY																						
k. SATISFACTORY	/	/	/	/	/	/	/	/	/	/	/	/	/	/	NOT AVAILABLE #1							
l. UNSATISFACTORY																						/
EXPERIMENT HARDWARE																						
m. SATISFACTORY	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
n. UNSATISFACTORY																						
DATA PROCESSING																						
o. SATISFACTORY	/	/	/	/	/	/	/	/	/	/	/	/	/	/	NOT AVAILABLE							
p. UNSATISFACTORY																						
ANOMALIES/PROBLEMS																						
No. Documented	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
No. Closed																						
SUMMARY																						
ACCEPTABLE	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
UNACCEPTABLE																						

*Extra Run for M151 (Not Planned).

NOTE #1: End of M092 run not filmed, per dump tape.

TABLE 3-10

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M 1 5 1

M092/M171 Preps

MISSION NO: SL-4
CREWMAN: C - S - P -
NAME: SEE BELOW

	FLIGHT								
EXP. REPETITION									
MISSION DAY	35	55	66	77	77	77			
	50	35	64	45	89				
JULIAN DAY	30	00	00	00	00				
	50	01	22	23	33				
	44	79	08	92	33				
PROTOCOL	C	S	P	S	C	P	S	S	C ← M092 SUBJECT CREWMAN
a. NOMINAL	/	/	/	/	/	/	/	/	/
b. UNSATISFACTORY									
PROCEDURES									
c. NOMINAL	/	/	/	/	/	/	/	/	/
d. DEVIATED									
CLINICAL FACTORS									
e. NONE				N/A					
f. SIGNIF. IMPACT									
TIME REQUIRED									
g. NOMINAL	/	/	/	/	/	/	/	/	/
h. ABOVE NOMINAL									
FILM QUALITY									
i. SATISFACTORY	NOT AVAILABLE								
j. UNSATISFACTORY									
FILM QUANTITY									
k. SATISFACTORY	NOT AVAILABLE								
l. UNSATISFACTORY									
EXPERIMENT HARDWARE									
m. SATISFACTORY	/	/	/	/	/	/	/	/	/
n. UNSATISFACTORY									
DATA PROCESSING									
o. SATISFACTORY	NOT AVAILABLE								
p. UNSATISFACTORY									
ANOMALIES/PROBLEMS									
No. Documented	0	0	0	0	0	0	0	0	0
No. Closed									
SUMMARY									
ACCEPTABLE	/	/	/	/	/	/	/	/	/
UNACCEPTABLE									

TABLE 3-10 (Cont'd)

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M 1 5 1

ETC Prep and Stow

MISSION NO: SL-4
CREWMAN: C - S - P -
NAME: _____

	PRE-FLT	FLIGHT	POST-FLIGHT
EXP. REPETITION	A	1 2 3 4 5 6 7	
MISSION DAY	U	1 2 3 5 5 6 7	
	G	2 9 7 0 8 7 6	
JULIAN DAY	2	3 3 3 0 0 0 0	
	2	3 4 5 0 1 2 3	
	2	1 8 6 4 2 1 0	
PROTOCOL			
a. NOMINAL	/	/ / / / / / /	
b. UNSATISFACTORY			
PROCEDURES			
c. NOMINAL	/	/ / / / / / /	
d. DEVIATED			
CLINICAL FACTORS			
e. NONE	N/A	← N/A →	
f. SIGNIF. IMPACT			
TIME REQUIRED			
g. NOMINAL	/	/ / / / / / /	
h. ABOVE NOMINAL			
FILM QUALITY			
i. SATISFACTORY	/	NOT AVAILABLE	
j. UNSATISFACTORY			
FILM QUANTITY			
k. SATISFACTORY	/	/ / / / / / /	
l. UNSATISFACTORY			
EXPERIMENT HARDWARE			
m. SATISFACTORY	/	/ / / / / / /	
n. UNSATISFACTORY			
DATA PROCESSING			
o. SATISFACTORY	/	NOT AVAILABLE	
p. UNSATISFACTORY			
ANOMALIES/PROBLEMS			
No. Documented	0	0 0 0 0 0 0 0	
No. Closed			
SUMMARY			
ACCEPTABLE	/	/ / / / / / /	
UNACCEPTABLE			

TABLE 3-10 (Cont'd)

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M 1 5 1
EVA (Pre and Post)
(Don and Doffing of PGA)

MISSION NO: SL-4
CREWMAN: C - S - P -
NAME: _____

	PRE-FLT	FLIGHT
EXP. REPETITION	J J	1 2 3
MISSION DAY	U U	0 4 8
	L L	7 4 0
JULIAN DAY	1 1	3 3 0
	8 5	2 6 3
	8 3	6 3 4
PROTOCOL		
a. NOMINAL	/ /	/ / /
b. UNSATISFACTORY		
PROCEDURES		
c. NOMINAL	/ /	/ / /
d. DEVIATED		
CLINICAL FACTORS		
e. NONE	N/A	N/A
f. SIGNIF. IMPACT		
TIME REQUIRED		
g. NOMINAL	/ /	/ / /
h. ABOVE NOMINAL		
FILM QUALITY		
i. SATISFACTORY	/ /	NOT AVAILABLE
j. UNSATISFACTORY		
FILM QUANTITY		
k. SATISFACTORY	/ /	/ / /
l. UNSATISFACTORY		
EXPERIMENT HARDWARE		
m. SATISFACTORY	/ /	/ / /
n. UNSATISFACTORY		
DATA PROCESSING		
o. SATISFACTORY	/ /	NOT AVAILABLE
p. UNSATISFACTORY		
ANOMALIES/PROBLEMS		
No. Documented	0 0	0 0 0
No. Closed		
SUMMARY		
ACCEPTABLE	/ /	/ / /
UNACCEPTABLE		

TABLE 3-10 (Cont'd)

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M 1 5 1 — MISSION NO: SL-4

M509 — 1973 — CREWMAN: C - S - P -

NAME: ____________

	PRE-FLT								FLIGHT													POST-FLIGHT						
EXP. REPETITION			O					J					1		2	3												
MISSION DAY			C					U				2	3	3	3	6												
			T					L				9	0	7	8	2												
JULIAN DAY	(1972)							2				3	3	3	3	0												
								0				4	4	5	5	1												
								3				8	9	6	7	6												
PROTOCOL																												
a. NOMINAL			/					/					/		/	/												
b. UNSATISFACTORY																												
PROCEDURES																												
c. NOMINAL			/					/					/		/	/												
d. DEVIATED																												
CLINICAL FACTORS																												
e. NONE				N/A										N/A														
f. SIGNIF. IMPACT																												
TIME REQUIRED																												
g. NOMINAL			/					/					/		/	/												
h. ABOVE NOMINAL																												
FILM QUANTITY																												
i. SATISFACTORY			/					/					NOT AVAILABLE															
j. UNSATISFACTORY																												
FILM QUALITY																												
k. SATISFACTORY			/					/					NOT AVAILABLE															
l. UNSATISFACTORY																												
EXPERIMENT HARDWARE																												
m. SATISFACTORY			/					/					/		/	/												
n. UNSATISFACTORY																												
DATA PROCESSING																												
o. SATISFACTORY			/					/					NOT PROCESSED															
p. UNSATISFACTORY																												
ANOMALIES/PROBLEMS																												
No. Documented			0					0					0		0	0												
No. Closed																												
SUMMARY																												
ACCEPTABLE			/					/					/		/	/												
UNACCEPTABLE																												

TABLE 3-10 (Cont'd)

M171-METABOLIC ACTIVITY

The M171 experiment (metabolic activity) was performed 12 times on each crewman during SL4. This met the requirements set down prior to the mission. Vital capacity was determined prior to the start of each test protocol. Instrumented physical training was done as a crew option and data was obtained the following number of times on each crewman: CDR - (5), SPT - (7), and PLT - (6).

No significant anomalies were recorded on the matabolic analyzer or bicycle ergometer. Mode 2, nitrogen ratioing was utilized throughout all the tests, as planned.

BPMS and VCG data were obtained on all the runs.

Table 3-11 contains a review of M171 data collection.

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M 1 7 1

MISSION NO: SL-4
CREWMAN: (C) - S - P -
NAME: CARR

	PRE-FLT								FLIGHT												POST-FLIGHT					
EXP. REPETITION	J	J	A	A	S	O	O	N	1	2	3	4	5	6	7	8	9	0	1	2	1	2	3	4	5	6
MISSION DAY	U	U	U	U	E	C	C	O	0	1	2	2	3	4	5	5	6	7	7	8	0	0	0	0	0	0
	N	L	G	G	P	T	T	V	5	3	1	8	5	3	1	9	6	3	9	3	0	1	2	4	5	8
JULIAN DAY	1	1	2	2	2	2	2	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0
	5	8	1	4	6	8	9	1	2	3	4	4	5	6	0	1	2	2	3	3	3	4	4	4	4	4
	2	7	3	0	9	5	9	0	4	2	0	7	4	2	5	3	0	7	3	7	9	0	1	3	4	7
PROTOCOL																										
a. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
b. UNSATISFACTORY																										
PROCEDURES																										
c. NOMINAL	/	/	/	/	/	/	/		/	/	/	/	/	/	/	/	/	/	/		/	/	/	/	/	/
d. DEVIATED																										
CLINICAL FACTORS																										
e. NONE	/	/	/	/	/	/	/		/	/	/	/	/	/	/	/	/	/	/		/	/	/	/	/	/
f. SIGNIF. IMPACT																										
TIME REQUIRED																										
g. NOMINAL	←	—	N/A	—	→				/	/	/	/	/	/	/	/	/	/	/		—	—	N/A	—	—	→
h. ABOVE NOMINAL																										
T/M QUALITY																										
i. SATISFACTORY	←	—	N/A	—	→				/	/	/	/	/	/	/	/	/	/	/		←	—	N/A	—	—	→
j. UNSATISFACTORY																										
T/M QUANTITY																										
k. SATISFACTORY	←	—	N/A	—	→				/	/	/	/	/	/	/	/	/	/	/		←	—	N/A	—	—	→
l. UNSATISFACTORY																										
EXPERIMENT HARDWARE																										
m. SATISFACTORY	←	—	N/A	—	→				/	/	/	/	/	/	/	/	/	/	/		←	—	N/A	—	—	→
n. UNSATISFACTORY																										
DATA PROCESSING																										
o. SATISFACTORY	/	/	/	/	/	/	/		/	/	/	/	/	/	/	/	/	/	/		/	/	/	/	/	/
p. UNSATISFACTORY																										
ANOMALIES/PROBLEMS																										
No. Documented	←	—	N/A	—	→				0	0	0	0	0	0	0	0	0	0	0		←	—	N/A	—	—	→
No. Closed																										
SUMMARY																										
ACCEPTABLE	/	/	/	/	/	/	/		/	/	/	/	/	/	/	/	/	/	/		/	/	/	/	/	/
UNACCEPTABLE																										

TABLE 3-11

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M 171

MISSION NO: SL-4
CREWMAN: C -(S)- P -
NAME: GIBSON

	PRE-FLT								FLIGHT												POST-FLIGHT					
EXP. REPETITION	J	J	J	A	S	0	0	N	1	2	3	4	5	6	7	8	9	0	1	2	1	2	3	4	5	6
MISSION DAY	U	U	U	U	E	C	C	0	0	1	2	2	3	4	5	5	6	7	7	8	0	0	0	0	0	0
	N	N	L	G	P	T	T	V	6	4	0	7	4	2	0	8	5	1	8	2	0	1	2	4	5	8
JULIAN DAY	1	1	2	2	2	2	2	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0
	7	8	1	4	6	8	9	1	2	3	3	4	5	6	0	1	1	2	3	3	3	4	4	4	4	4
	8	1	2	3	8	5	9	0	5	3	9	6	3	1	4	2	9	5	2	6	9	0	1	3	4	7
PROTOCOL																										
a. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/		/	/	/	/	/	/
b. UNSATISFACTORY																										
PROCEDURES																										
c. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/		/	/	/	/	/	/
d. DEVIATED																										
CLINICAL FACTORS																										
e. NONE	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/		/	/	/	/	/	/
f. SIGNIF. IMPACT																										
TIME REQUIRED																										
g. NOMINAL	←	—	—	N/A	—	→			/	/	/	/	/	/	/	/	/	/	/		←	—	N/A	—	→	
h. ABOVE NOMINAL																										
T/M QUALITY																										
i. SATISFACTORY	←	—	—	N/A	—	→			/	/	/	/	/	/	/	/	/	/	/		←	—	N/A	—	→	
j. UNSATISFACTORY																										
T/M QUANTITY																										
k. SATISFACTORY	←	—	—	N/A	—	→			/	/	/	/	/	/	/	/	/	/	/		←	—	N/A	—	→	
l. UNSATISFACTORY																										
EXPERIMENT HARDWARE																										
m. SATISFACTORY	←	—	—	N/A	—	→			/	/	/	/	/	/	/	/	/	/	/		←	—	N/A	—	→	
n. UNSATISFACTORY																										
DATA PROCESSING																										
o. SATISFACTORY	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/		/	/	/	/	/	/
p. UNSATISFACTORY																										
ANOMALIES/PROBLEMS																										
No. Documented	←	—	—	N/A	—	→			0	0	0	0	0	0	0	0	0	0	0		←	—	N/A	—	→	
No. Closed																										
SUMMARY																										
ACCEPTABLE	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/		/	/	/	/	/	/
UNACCEPTABLE																										

TABLE 3-11 (Cont'd)

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M 1 7 1 — MISSION NO: SL-4
CREWMAN: C - S -(P)-
NAME: POGUE

	PRE-FLT								FLIGHT												POST-FLIGHT					
EXP. REPETITION	J	J	J	A	S	O	O	N	1	2	3	4	5	6	7	8	9	0	1	2	1	2	3	4	5	6
MISSION DAY	U	U	U	U	E	C	C	O	0	1	1	2	3	4	4	5	6	7	7	8	0	0	0	0	0	0
	N	N	L	G	P	T	T	V	5	3	9	6	3	2	9	7	3	0	8	3	0	1	2	4	5	8
JULIAN DAY	1	1	2	2	2	2	2	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0
	5	8	1	4	6	8	9	1	2	3	3	4	5	6	0	1	1	2	3	3	3	4	4	4	4	4
	2	1	2	3	9	5	9	0	4	2	8	5	2	1	3	1	7	4	2	7	9	0	1	3	4	7
PROTOCOL																										
a. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
b. UNSATISFACTORY																										
PROCEDURES																										
c. NOMINAL	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
d. DEVIATED																										
CLINICAL FACTORS																										
e. NONE	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
f. SIGNIF. IMPACT																										
TIME REQUIRED																										
g. NOMINAL	←	—	—	N/A	—	—	→		/	/	/	/	/	/	/	/	/	/	/	/	←	—	N/A	—	—	→
h. ABOVE NOMINAL																										
T/M QUALITY																										
i. SATISFACTORY	←	—	—	N/A	—	—	→		/	/	/	/	/	/	/	/	/	/	/	/	←	—	N/A	—	—	→
j. UNSATISFACTORY																										
T/M QUANTITY																										
k. SATISFACTORY	←	—	—	N/A	—	—	→		/	/	/	/	/	/	/	/	/	/	/	/	←	—	N/A	—	—	→
l. UNSATISFACTORY																										
EXPERIMENT HARDWARE																										
m. SATISFACTORY	←	—	—	N/A	—	—	→		/	/	/	/	/	/	/	/	/	/	/	/	←	—	N/A	—	—	→
n. UNSATISFACTORY																										
DATA PROCESSING																										
o. SATISFACTORY	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
p. UNSATISFACTORY																										
ANOMALIES/PROBLEMS																										
No. Documented	←	—	—	N/A	—	—	→		0	0	0	0	0	0	0	0	0	0	0	0	←	—	N/A	—	—	→
No. Closed																										
SUMMARY																										
ACCEPTABLE	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
UNACCEPTABLE																										

TABLE 3-11 (Cont'd)

M172 - BODY MASS MEASUREMENT DEVICE (BMMD)

The BMMD operated routinely for daily crew mass measurements and several extra body mass measurements associated with the insensible water loss study. No other use was made of the device and no other stability studies were done with it. Three cals. were performed with the same uncertainties of the cal. masses previously noted during earlier missions. The device remained extremely stable, but approximately 5 days prior to end of the mission the subject release mechanism failed. This unit had failed in the same mode on final ground cal/checkout. The remainder of the measurements were made with the calibration release mechanism. This procedure required the assistance of a second crewman.

Table 3-12 contains a review of M172 data collection.

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M 1 7 2

MISSION NO: SL-4
CREWMAN: C - S - P -
NAME: N/A

	PRE-FLT	FLIGHT				POST-FLIGHT
EXP. REPETITION		1	2	3	4	
MISSION DAY		0	1	4	7	
		4	1	7	5	
JULIAN DAY		3	3	0	0	
		2	3	0	2	
		3	0	1	9	
PROTOCOL		#1				
a. NOMINAL			/	/	/	
b. UNSATISFACTORY		/				
PROCEDURES						
c. NOMINAL		#1	/	/	/	
d. DEVIATED		/				
CLINICAL FACTORS						
e. NONE			N/A			
f. SIGNIF. IMPACT						
TIME REQUIRED						
g. NOMINAL		/	/	/	/	
h. ABOVE NOMINAL						
DATA QUALITY						
i. SATISFACTORY		/	/	/	/	
j. UNSATISFACTORY						
DATA QUANTITY						
k. SATISFACTORY			/	/	/	
l. UNSATISFACTORY		/				
EXPERIMENT HARDWARE						
m. SATISFACTORY		/	/	/	/	
n. UNSATISFACTORY						
DATA PROCESSING		/	/	/	/	
o. SATISFACTORY						
p. UNSATISFACTORY						
ANOMALIES/PROBLEMS						
No. Documented		1	0	0	0	
No. Closed		1				
SUMMARY						
ACCEPTABLE			/	/	/	
UNACCEPTABLE		/				

#1 - Zero Cal. Only.

TABLE 3-12

SPECIAL TESTS

The following special medical tests and Detailed Test Objectives (DTO's) were performed during the course of SL-4.

1. Inflight Hemoglobin and Urine Specific Gravity Determinations
2. Instrumented Exercise Determination
3 Facial Photography
4. Atmospheric Volatile Concentrator
5. Environmental Microbiology
6. Water Sample
7. Iodine Monitoring
8. Carbon Monoxide Monitor
9. Taste and Aroma Evaluation
10. Girth and Weight Measurements and Crew Profile Photographs
11. Sweat Samples
12. Blood Flow in Limbs
13. Stereophotogrammetry
14. Visual Light Flash Phenomena
15. Insensible Water Loss
16. Pre- and Post Exercise Muscle Girth Measurements

Condensations of the test descriptions appear on subsequent pages. Accomplishments have been summarized earlier in Tables 1.2 (page 12) and 2.2 (page 15).

1. INFLIGHT HEMOGLOBIN AND URINE SPECIFIC GRAVITY DETERMINATIONS

The purposes of these tests are (1) to obtain inflight changes of hemoglobin level and urine specific gravity in comparison with pre- and post-flight data, and (2) to assess the accuracy of these measurements in weightlessness. These determinations were to be accomplished in conjunction with each M110 blood draw in flight.

2. INSTRUMENTED EXERCISE DETERMINATION

The value of personal exercise as a countermeasure to prevent cardiovascular and musculoskeletal deconditioning and to maintain crewmembers' fitness was postulated from the preceding two manned Skylab experiences. Quantification of applicable personal exercise (PT) and workload is technically difficult.

The purpose of this test is to obtain quantitative PT workloads utilizing the M171 ergometer and to assess daily and total personal exercise quantitatively in conjunction with work expended on scheduled M171 and M093 exercises.

3. FACIAL PHOTOGRAPHY

The purpose of this test is to obtain a series of facial photographies in conjunction with M092 Lower Body Negative Pressure experiment to record acute and chronic changes of facial configuration and superficial venous filling caused by gravitational unloading, possible fluid shifts and eventual accommodations during the space flight.

4. ATMOSPHERIC VOLATILE CONCENTRATOR (MRD 20.23)

The purpose is to obtain samples and analyze the organic volatile constituents from the SWS environment to assess a profile of the organic volatile constituents in the SWS using three Atmospheric Volatile Concentrator devices (AVC's).

5. ENVIRONMENTAL MICROBIOLOGY (MRD 20.10

The purpose is to obtain inflight microbial and fungus samples from SWS hardware and atmosphere in order to assess patterns of buildup or die-down of various strains. These data will be used for the development of preventive measures to control potential crew illnesses on future flights and to establish contamination control requirements for vehicular habitability.

6. WATER SAMPLE (MRD 20.16)

The purpose is to collect and analyze inflight water samples to verify the chemical quality of the water to assess the impact of the potable water constituents on Experiments M071 (Mineral Balance) and M073 (Bio-assay of Body Fluids), and to contribute to the development of future potable water supply systems.

7. IODINE MONITORING (MRD 20.17)

The purposes are to obtain inflight data on iodine concentrations in the orbital workshop (OWS) potable water system and inject

iodine, if indicated, to control biocidal activity to assure continuing water potability for protecting crew health.

8. CARBON MONOXIDE MONITOR (MRD 20.18)

The purpose is to determine whether there is a sufficient build-up of carbon monoxide (CO) in the cluster to interfere with the interpretation of medical experiment results or, in an extreme case, compromise crew safety.

9. TASTE AND AROMA EVALUATION (MRD 20.21)

The purposes of this inflight test are to obtain quantitative data on the possible diminution of the taste threshold during the spaceflight, to gain a further understanding of physiological characteristics of man in flight and to formulate better food menus for future space flights.

10. GIRTH AND WEIGHT MEASUREMENTS AND CREW PROFILE PHOTOGRAPHS(MRD 20.25)

The purpose was to obtain data on crewman body size and configuration changes during exposure to weightlessness by comparing inflight data with pre- and post-flight data. The methods used to determine relationships of the changes were multiple circumference measurements, center of gravity (mass) measurements, and infrared photography. This range of measurement techniques will provide a better understanding of early shifting of body fluids together with slower changes of body morphology and fat/muscle derangement.

11. SWEAT SAMPLES (MRD 20.27)

The purpose is to determine changes in the salinity of body sweat, to assess any change in normal sweat patterns which occurred under weightlessness, and to establish a relationship of these findings with disturbances of mineral balance mechanisms occurring on Skylab flights. The scheduling of this test was cancelled midway through the mission in order to save crew time for other activities.

12. BLOOD FLOW IN LIMBS (MRD 20.28) (CV #1 & CV #2)

The purposes of this special test are to provide additional information for the assessment of the cardiovascular state and deconditioning process, particularly in support of M092 Lower Body Negative Pressure (LBNP) experiment. Test procedures and measurements will elucidate the factors of limb blood flow and the pumping action of muscles in the legs so that a better understanding can be attained about changes to the cardiovascular system during prolonged weightlessness and to explain changes to the cardiovascular system which affect its ability to tolerate lower body negative pressure stresses.

13. STEREOPHOTOGRAMMETRY (MRD 20.29)

The purpose is to obtain quantitative body volume data, to determine possible shifting of body fluids in weightlessness, and to determine if progressive changes occur over the period of a long duration flight.

14. VISUAL LIGHT FLASH PHENOMENA (MRD 20.31)

The purpose is to obtain additional data on the observation of light flashes in earth orbit to provide a better foundation for further investigative plans to ascertain if there is a latitude effect on the frequency of the flashes, causes of the phenomenon, (possibly Cerenkov radiation or HZE particles) and eventually to evaluate effects of this phenomenon to man's safety and health.

15. INSENSIBLE WATER LOSS

The purpose is to obtain data to assess insensible body water loss of the crew members during the spaceflight in conjunction with the crew members' intake and urine output in support of Body Fluid, Nutrition, Cardiovascular, and Metabolic Activity Experiments.

16. PRE- AND POST EXERCISE MUSCLE GIRTH MEASUREMENT.

The purpose is to obtain additional data of pre- and post exercise changes to limb girth as an adjunct to the anthropometric measurements (MRD 20.25).

SECTION IV

SUMMARY OF DIFFICULTIES AND ANOMALIES

This section contains a tabulation of the difficulties and anomalies, together with the corrective action status, involved with the operation of each experiment. Equipment problems that were resolved prior to the start of an experiment are not included nor are telemetry and data processing problems which had workarounds. All hardware failures are tracked by an adequate tracking system and will be included in JSC's Skylab Mission Report for the third visit. Most of the problems included here are tracked by the Skylab Medical Anomaly Report system and are referenced here by the SMAR number. Other problems are documented in the minutes of the Medical Management Team where the PI's, PCS's, LSD Mission Managers, Biomedical Experiment Officers and Mission Surgeons reported problems daily, as soon as they were recognized.

SL-4

PERFORMANCE DIFFICULTY AND ANOMALY SUMMARY
EXPERIMENT NO. AND TITLE: M073 BIO-ASSAY OF BODY FLUIDS

CATEGORY	DATE	PROBLEM DESCRIPTION	CORRECTIVE ACTION AND STATUS
Hardware (SMAR # 4-003 and 4-024)	JD 324 and JD 016	Leak in urine sample bag.	SPT used another bag. (The Collection bags could be weighed in the BMMD and the sample omitted if the problem reoccurred). CLOSED
Hardware (SMAR # 4-012)	JD 338	Leak in urine collection bag around the rubber nipple (reused bag).	CDR replaced bag. Would result in an incomplete 24-hour collection. CLOSED
Expendibles (SMAR # 4-013 and 4-015)	JD 335 and JD 341	Undissolved boric acid pellets noticed in urine collection bag.	Believed to be due to lack of mixing in o-g. No effect on mission, data or other hardware. CLOSED
Hardware (SMAR # 4-029)	JD 033	Urine collection bag boot broke.	Lost a small amount of urine. No corrective action requested. OPEN

TABLE 4.1

SL-4

PERFORMANCE DIFFICULTY AND ANOMALY SUMMARY
EXPERIMENT NO. AND TITLE: M133 SLEEP MONITORING

CATEGORY	DATE	PROBLEM DESCRIPTION	CORRECTIVE ACTION AND STATUS
Hardware (SMAR # 4-017)	JD 344	Erratic readings prior to starting run when cable from sleep cap to preamp. was jiggled.	SPT replaced cable with a spare cable. Problem attributed to extensive use. CLOSED
Hardware (SMAR # 4-023)	JD 005	Telemetry lost after two hours of the run.	Checking the cable connections eliminated the problem. Analog tape returned after the mission should have the complete data so the run was considered acceptable. CLOSED

TABLE 4.2

SL-4

PERFORMANCE DIFFICULTY AND ANOMALY SUMMARY
EXPERIMENT NO. AND TITLE: M074-SPECIMEN MASS MEASUREMENT

CATEGORY	DATE	PROBLEM DESCRIPTION	CORRECTIVE ACTION AND STATUS
PROCEDURAL (SMAR # 4-020)	JD 358	All but one SMMD calibration weight (500 gm) reported missing	No corrective action feasible or necessary. Calibrations run at 0-500-0 grams verified continued stability. CLOSED
Hardware (SMAR # 4-032)	JD 035	The curtain was reported separated from the frame of the SMMD in the Waste Management Compartment.	Wardroom SMMD was used. No repairs attempted since the mission was almost completed. CLOSED

TABLE 4.3

PERFORMANCE DIFFICULTY AND ANOMALY SUMMARY
EXPERIMENT NO. AND TITLE: M092 - LOWER BODY NEGATIVE PRESSURE

CATEGORY	DATE	PROBLEM DESCRIPTION	CORRECTIVE ACTION AND STATUS
Procedural (SMAR # 4-002)	JD 329	BPMS not updating During M092 run on SPT, the blood pressure stopped updating after the first few cycles due to closed nitrogen valve on panel 225.	Crew opened the valve and the system operated nominally during the last of the run. Manual BP's were taken. CLOSED
Procedural (SMAR # 4-010)	JD 332	Leg Band calibration drift downward on the right leg band (AQ) during calibration of M092.	Crew readjusted the size from 14 to 13 to get better tongue and groove contact. CLOSED
Procedural (SMAR # 4-009)	JD 332	Sub Frame 3 data loss due to a tape recorder switch in the wrong position caused by crews' omission of cue card verification in respect to Experiment 1 and Experiment 2.	Explanation of error required to crew. CLOSED

TABLE 4.4

PERFORMANCE DIFFICULTY AND ANOMALY SUMMARY
EXPERIMENT NO. AND TITLE: M092 - LOWER BODY NEGATIVE PRESSURE (Cont'd)

CATEGORY	DATE	PROBLEM DESCRIPTION	CORRECTIVE ACTION AND STATUS
Hardware (SMAR # 4-011)	JD 334	Spikes during electrode impedance and isolation checks.	Data review showed no evidence of "spiking". No corrective action was offered. CLOSED
Hardware (SMAR # 4-027)	JD 348	Blood Pressure Cuff S/N 011 failure; no blood pressure light or reading on S/N 011.	Crew switched to S/N 012. CLOSED
Hardware/Procedure (SMAR # 4-018)	JD 349-350	During M092 run on SPT (JD 349) and on CDR (JD 350), the reading of the right leg band, S/N AQ, exhibited anomalies consisting of high off-scale and non-responsiveness of the reading to the delta pressure application.	A trouble-shooting attempted on JD 357. No intermittency of the Y cable/legband interface connector was found, but nominal operation has occurred 17 times subsequent to the reported anomalies. CLOSED.

TABLE 4.4 (Cont'd)

PERFORMANCE DIFFICULTY AND ANOMALY SUMMARY
EXPERIMENT NO. AND TITLE: M092 - LOWER BODY NEGATIVE PRESSURE (Cont'd)

CATEGORY	DATE	PROBLEM DESCRIPTION	CORRECTIVE ACTION AND STATUS
Hardware (SMAR # 4-026)	JD 028	AQ Leg Band intermittent indication during gain adjust when the cable was wiggled.	No action required because of a stable output obtained at rest and during the M092 run. CLOSED

TABLE 4.4 (cont'd)

SL-4

PERFORMANCE DIFFICULTY AND ANOMALY SUMMARY
EXPERIMENT NO. AND TITLE: M110 - HEMATOLOGY AND IMMUNOLOGY

CATEGORY	DATE	PROBLEM DESCRIPTION	CORRECTIVE ACTION AND STATUS
Procedural (SMAR # 4-001 and 4-004)	JD 322	Plasma sample had a slight pinkish cast.	Procedures that could have caused rupture of the red blood cells were discussed with crew. CLOSED
Procedural (SMAR # 4-008)	JD 322	Blood sample coagulated in the needle and did not enter the ASP. Two ASP's were used and the sample (JD 322, SPT) has some air in it.	Crew was advised to agitate the syringe for better mixing of blood and anticoagulant. CLOSED
Procedural (SMAR # 4-005)	JD 324	Discovered that there was no vacuum source for evacuating the ASP because of the LBNPD vent modification.	A syringe was used for early blood draws. Procedure sent to crew to utilizing available hoses with the proper QD's. CLOSED

TABLE 4.5

PERFORMANCE DIFFICULTY AND ANOMALY SUMMARY
EXPERIMENT NO. AND TITLE: M110 - HEMATOLOGY & IMMUNOLOGY (Cont'd)

CATEGORY	DATE	PROBLEM DESCRIPTION	CORRECTIVE ACTION AND STATUS
Procedural or Hardware Contamination (SMAR # 4-022)	JD 365	SPT's plasma sample was a dark yellow with a small amount of red in it.	SPT reminded not to overfill the ASP in case that was the cause. CLOSED

TABLE 4.5 (Cont'd)

SL-4

PERFORMANCE DIFFICULTY AND ANOMALY SUMMARY
EXPERIMENT NO. AND TITLE: M171 - METABOLIC ACTIVITY

CATEGORY	DATE	PROBLEM DESCRIPTION	CORRECTIVE ACTION AND STATUS
Procedural (SMAR # 4-006)	JD 323	Pressure buildup in Spirometer due to checklist error.	No action required to the hardware. The system operated nominally. CLOSED
Hardware (SMAR # 4-014)	JD 338 JD 028 and JD 034	Mark I Exerciser Failure: Recoil mechanism failed due to broken recoil spring (JD 338 and JD 028). Mark I Exerciser return spring broke again. (JD 034)	Crew repaired the Mark I Exercise twice. No repair was done after the third failure. CLOSED.

TABLE 4.6

SL-4

PERFORMANCE DIFFICULTY AND ANOMALY SUMMARY
EXPERIMENT NO. AND TITLE: M172 - BMMD

CATEGORY	DATE	PROBLEM DESCRIPTION	CORRECTIVE ACTION AND STATUS
Hardware (SMAR # 4-028)	JD 032	M172 BMMD release intermittent	Crew devised an alternate mode of operation using the calibration release. (An adjustment procedure that could have fixed the release was not sent to the crew). CLOSED

TABLE 4.7

SL-4

PERFORMANCE DIFFICULTY AND ANOMALY SUMMARY
EXPERIMENT NO. AND TITLE: FOOD SYSTEM PERFORMANCE

CATEGORY	DATE	PROBLEM DESCRIPTION	CORRECTIVE ACTION AND STATUS
Hardware (SMAR # 4-007)	JD 327	The salt dispenser nozzles plug with the dried salt causing occasional spills by squeezing of the bag.	Corrective action procedures were sent to the crew. Crew was also advised to keep tape over syringe orifice and dispenser bag valve. CLOSED
Hardware (SMAR # 4-016)	JD 341	Peanut Butter can leakage.	Discarded can. Cause was probably lid seam failure. CLOSED
Hardware (SMAR # 4-019)	JD 352	Apollo food bag split when the valve did not function and caused water pressure to split the valve of the spoon bowl type rehydratable package used inside the large food can.	Crewman cut hole in bag to permit adding water for rehydration. No other bag reported with this water inlet problem. CLOSED.

TABLE 4.7

SL-4

PERFORMANCE DIFFICULTY AND ANOMALY SUMMARY
EXPERIMENT NO. AND TITLE: FOOD SYSTEM PERFORMANCE (cont'd)

CATEGORY	DATE	PROBLEM DESCRIPTION	CORRECTIVE ACTION AND STATUS
Hardware (SMAR # 4-031)	JD 035	Pineapple can leaked and the contents were spoiled.	Discarded. CLOSED

TABLE 4.7 (cont'd)